

Digital Cam Switch Unit

CamCon DC30/X

with 8 programs



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1. Introduction

Electrical cam switch units have been used successfully by the industry for a long time. The experiences which have been collected in close co-operation with the users of switching devices during these years have been considered during the development of the CamCon 30. The result is a compact digital cam switch unit which offers a maximum of user friendliness and reliability. The following characteristics distinguish CamCon:

- * Experienced and reliable hardware
- * 16 short circuit-proof outputs
- * Large and well visible seven-segment display for program, position and speed
- * As many cams per output as programmable
- * Optimizing of the switching points while the machine operates
- * In ms adjustable compensation of the mechanical dead time of switch units
- * Switchboard normencasement 144 x 144 x 63 mm according to DIN 43700
- * Voltage supply 24V DC +/- 20%

Cam switch units are being used everywhere where switch procedures are being periodically repeated. Digital cam switch units replace mechanical ones optimally and furthermore offer other advantages, for example:

- * Simplification of assembly and adjustment procedures
- * Reproducible justage
- * Standardization for all possible ranges of operation
- * Reliability

Notification

This booklet corresponds with the software standard of the CamCon DC30 of the November 1996.

The company Digitronic Automationsanlagen GmbH has reserved the right to alterations without prior notice, if these are followed by an improvement of the quality or the functioning of this piece of equipment.

The instruction booklet has been constructed exercising maximum care, but mistakes are not exactly out of the question. We are grateful for any hints concerning possible mistakes in the booklet.

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2. Principle of function

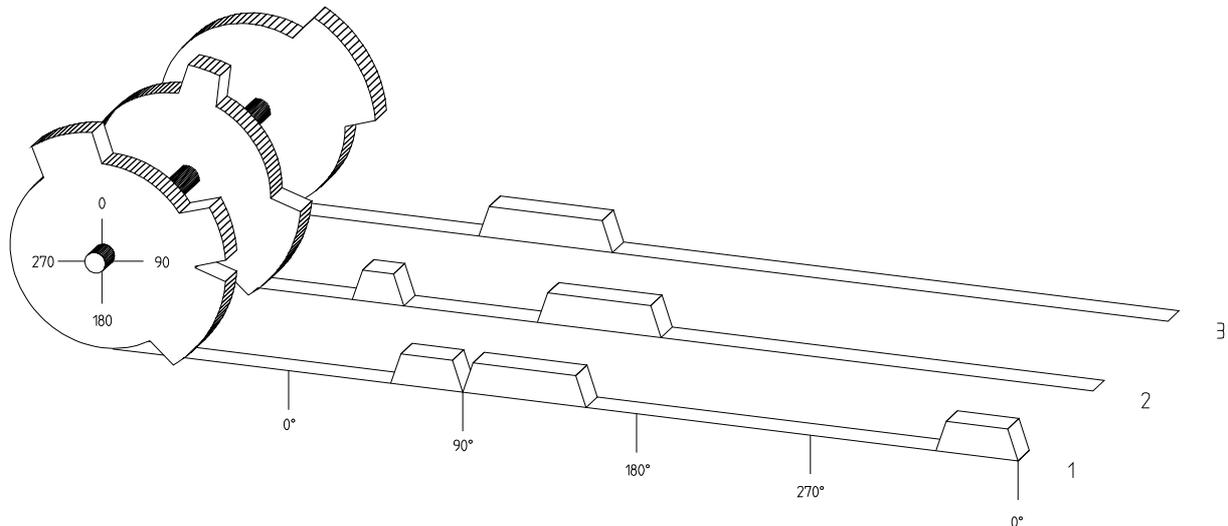


Fig.: Presentation of the principle of function of a cam switch unit

For a better understanding of the function of a cam switch unit its principle is presented here. It has 3 outputs containing the following cams:

Output 1:	Cam 1:	Activation point	60°	Deactivation point	85°
	Cam 2:	Activation point	95°	Deactivation point	145°
	Cam 3:	Activation point	325°	Deactivation point	355°
Output 2:	Cam 1:	Activation point	5°	Deactivation point	20°
	Cam 2:	Activation point	95°	Deactivation point	145°
Output 3:	Cam 1:	Activation point	30°	Deactivation point	85°

The three progressions, presented as beds, of the output signals occur, if the 3 cam plates turn anticlockwise past a sensor, which scans the cams on the 0° axis.

The duration of the activation of a mechanical cam switch unit, i.e. the range between the activation and deactivation point, is determined by the length of the cams. The length and the position of the cams can only be limitedly varied, which additionally demands a relatively high mechanical and chronological expenditure. With the CamCon, these justages are realizable in a fraction of a second, besides the number of the cams per bed is optional. An encoder, which has been connected to the device reports the position. The CamCon compares this with the programmed (de)activation points from all the outputs. If a position appears in a range of a programmed activation or deactivation point (cams), all affected outputs will be switched.

A small numerical example shall serve the illustration:

Assuming that the drive roll with the measuring system has a circumference of 360mm, so that one millimeter at the circumference corresponds exactly to one angle degree of the measuring system.

The unit has the following parameter:

$$\begin{aligned}v_{\text{drop}} &= 20\text{m/s} \\d &= 20\text{cm} \\T_{\text{MV}} &= 20\text{ms}\end{aligned}$$

Out of this results a flight time of the drop to

$$t_{\text{Flight}} = \frac{d}{v_T} = \frac{0,2\text{m}}{20\text{m/s}} = 10\text{ms}$$

So the complete dead time amounts to $T_{\text{dead, altogether}} = T_{\text{MV}} + t_{\text{Flight}} = 20\text{ms} + 10\text{ms} = 30\text{ms}$

During this time the paper web travels by the distance $x = v_{\text{paper}} \cdot T_{\text{dead, altogether}} = 1\text{m/s} \cdot 30\text{ms} = 30\text{mm}$ further on.

The switching point of the magnetic valve has to be transferred 30° to the front to compensate this dead time.

If one doubles the speed of the system and with that v_{paper} , the distance x , by which the paper web is moving on, is also doubled. In this case the switching point has to be transferred by 60° .

Note that in this explanation the dead time is a solid quantity, which is determined by the mechanical regulation and switching parts as well as by the measurement of the construction, hence it does not change.

If one were now to program the complete dead time of 30ms on the appropriate output of the CamCon, the drop of glue would always hit the exact spot at any speed.

2.1.1. Calculating the dead time

There are several possibilities for calculating the dead time of a relay or a valve.

2.1.1.1. Calculating the dead time through relocations that have already occurred

Program the switching point of the relay or valve during a standstill of the machine. We use the switching point of 200 degrees in our example. If the machine is now run with a speed of e.g. 40 min^{-1} , a relocation occurs because of the dead time. This relocation is measured and is 40 degrees in our example.

Attention: To calculate the relocation correctly you have to set the programmed dead time of the cam switch unit to zero.

The dead time of the switching member is calculated according to the following formula:

$$\text{Dead time (in sec.)} = \frac{\text{D way (in degrees)} * 60 \text{ (sec./min.)}}{\text{speed (in min}^{-1}\text{)} * 360 \text{ (degrees/rotations)}}$$

$$\text{Dead time (in sec.)} = \frac{40 * 60}{40 * 360} = 0.1667 \text{ sec.}$$

The calculated dead time is now set in the CamCon.

2.1.1.2. Calculating the dead time through the difference of measured values

The switching point is determined at a speed of e.g. 50 min^{-1} . In our example, the programmed switching point is at 200 degrees. The second measurement occurs at a speed of 80 min^{-1} . The needed switching point has to be set to 160 degrees to reach the exact switch point again at 80 min^{-1} .

Attention: To determine the two switching points you have to set the programmed dead time of the cam switch unit to zero.

The dead time of the switching member is calculated with the following formula:

$$\text{Dead time (in sec.)} = \frac{\text{D way (in degrees)} * 60 \text{ (sec./min.)}}{\text{D speed (in min}^{-1}\text{)} * 360 \text{ (degrees/rotations)}}$$

$$\text{Dead time (in sec.)} = \frac{40 * 60}{30 * 360} = 0.222 \text{ sec.}$$

The determined dead time is now entered into the cam mechanism. Since this dead time is set for the whole range of the speed, it now becomes necessary to adjust the cam to the speed at 0 min^{-1} . To determine the exact activation point you have to enter the difference to the speed 0 min^{-1} at the first measured activation point. The difference is calculated according to the following formula:

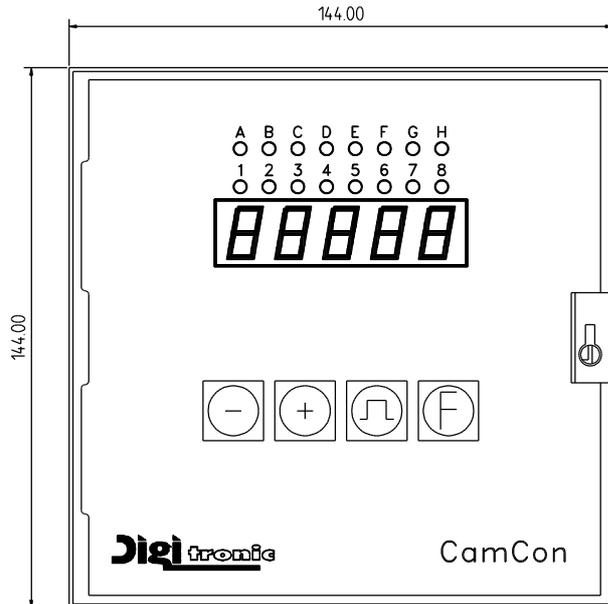
$$\text{D way (in degrees)} = \frac{\text{dead time (in sec.)} * \text{D time (in min}^{-1}\text{)} * 360 \text{ (degrees/rotations)}}{60 \text{ (sec./min.)}}$$

$$\text{D way (in degrees)} = \frac{0.222 * 50 * 360}{60} = 66.6 \text{ degrees}$$

The activation point of the cam is now relocated by 67 degrees, from 200 degrees to 267 degrees.

3. Mechanical installation instructions

To incase the front plate, the CamCon is inserted into an opening (as shown in the drawing). The grounding clip is to be connected with the central grounding spot on the back of the encasement and with the switchboard encasement (if available) . All cable connections are to be made in a cold state! The screening of the cable of the measuring system, or the voltage supply and outputs is to be put on the grounding clip.



cutout as per DIN 138 +1 x 138 +1

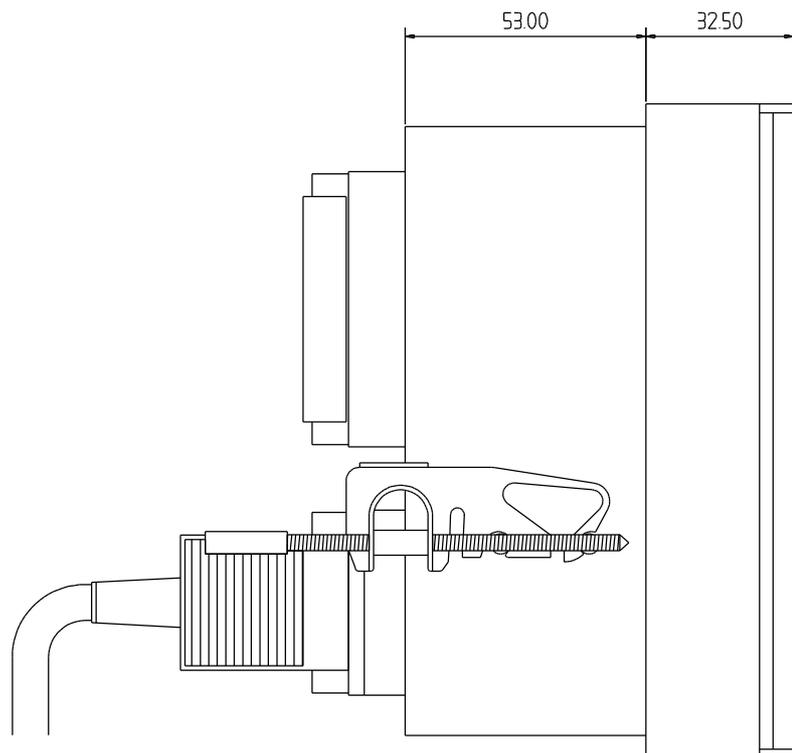
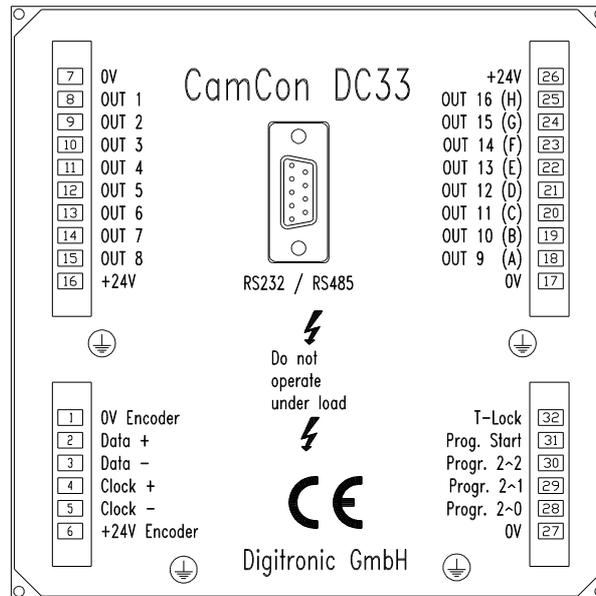


Fig.: Drawing to aid the installation of CamCon

4. Electrical connections



4.1. Pin allocation CamCon with 16 outputs and 8 programs

- Pin 1: 0V for encoder
- Pin 2: Data A or +
- Pin 3: Data B or -
- Pin 4: Clock A or +
- Pin 5: Clock B or -
- Pin 6: +24V DC for encoder

- Pin 7: 0V supply
- Pin 8: Output 1
- Pin 9: Output 2
- Pin 10: Output 3
- Pin 11: Output 4
- Pin 12: Output 5
- Pin 13: Output 6
- Pin 14: Output 7
- Pin 15: Output 8
- Pin 16: +24V DC supply

- Pin 17: 0V supply
- Pin 18: Output 9 (A)
- Pin 19: Output 10 (B)
- Pin 20: Output 11 (C)
- Pin 21: Output 12 (D)
- Pin 22: Output 13 (E)
- Pin 23: Output 14 (F)
- Pin 24: Output 15 (G)
- Pin 25: Output 16 (H)
- Pin 26: +24V DC supply

- Pin 27: 0V for program selection
- Pin 28: Input 1 (2^0) for program selection
- Pin 29: Input 2 (2^1) for program selection
- Pin 30: Input 4 (2^2) for program selection
- Pin 31: Input for the program number transfer
- Pin 32: Input for the activation of the keyboard lock

4.2. The encoder

The voltage supply of the encoder is internally connected to the voltage supply of the outputs. If the supply voltage is connected to the outputs, the encoder is also supplied. The data transfer from the encoder to the CamCon takes place through a bidirectional RS422 interface. The data protocol corresponds with the Stegmann SSI Norm.

4.3. The outputs

CamCon is equipped with either 8 or 16 short circuit-proof outputs, depending on the version. They emit 24V high active signals and are not potentially free. They supply up to 500mA permanent current in a surrounding temperature of 25°C. If an output short circuits or overloads, the device switches off with the "A-Err" message.



Attention: *With inductive loads the outputs have to be switched with free wheeling diodes.*

4.4. External program selection

The CamCon offers the possibility to select the desired program number externally, through special outputs. To do this you have to enter the program number as a binary digit at the pins for the external program selection (pins 28, 29 and 30). With an impulse (+24V), that has to be entered at least 20ms after the program number and that has to be at least 20ms long, the program is selected at the input for the program number transfer (pin 31).

4.5. External activation of the keyboard lock

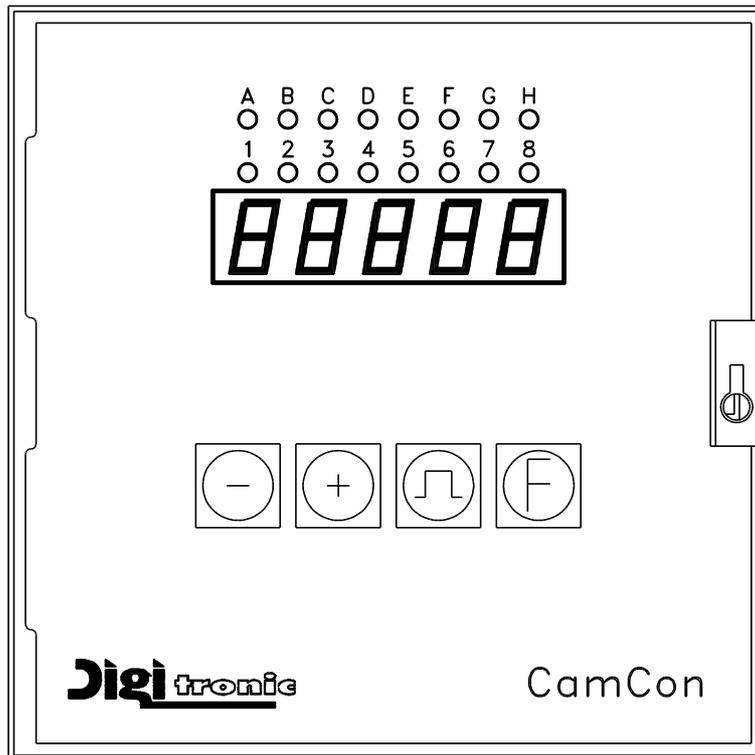
A signal (+24V DC) at the input for the activation of the keyboard lock (pin 32) disables the keys  and . This makes it impossible to initialize or program the device.

4.6. Precautions to be taken at welding operations

For the duration of welding operations carried out at the machine, the connecting wires concerning the data exchange from the measuring system to the CamCon and the power supply as well as the grounding connections and inputs and outputs have to be separated from the CamCon.

5. Outline of the operator terminal

5.1. Frontview CamCon



5.2. The output display

The output display shows the current states of the outputs. If a LED is illuminated, the corresponding output is active.

5.3. The seven-segment display

This display is divided into two ranges. The 1. and the 2. segment show the current mode of CamCon, and the segments 3, 4 and 5 display the value pertaining to this mode.

5.4. The keyboard

The **+** key serves for increasing the input values by the value one. If you keep the **+** key pressed for about two seconds, the input values will increase automatically until released.

The **-** key is used to reduce the input values by the value one. Keeping the **-** key pressed for about two seconds will cause the input values to decrease automatically until the release of the **-** key.

The **□** key serves for the initiation of the programming mode and/or for the modification of the input type.

The **F** key is used for the initiation of the system mode, for the selection of the system constants and/or for selecting the outputs in the programming mode.

5.4.1. Display of position and speed

After the activation and after having left the programming modes the 7-segment display shows the current program number and the rotatory speed in rotations/minute. By pressing the **+** key, the angular position of the encoder, e.g. **□ | □ □** is displayed. If the **-** key is pressed, the display will show the current program number and the rotatory speed.

6. Commissioning

Before activating the device for the first time, please check its wiring (see chapter 4. Electrical connections).



Attention: *With induced loads the outputs have to be switched with a freewheeling diode. Covers or inductivities very close to the device inside the switchboard have to be switched with a deletion unit as do those that are wired to or influence the wiring of the device.*

6.1. Complete deletion

After the first activation of the supply voltage the program memory is not in an initialized mode. This leads to the CamCon's display showing incomprehensible symbols. That is why you (at the first activation of your CamCon) have to put a complete deletion into process as follows:

1. Activate the device (supply with voltage, +24V DC).
2. Wait until the display shows either a number or $\text{I} - \text{E} \text{ r} \text{ r}$.
3. Press the — key four times.
4. Press the + key four times.
5. Press the F key (about 2sec.), until $\text{□} \text{ } \exists \text{E} \text{ □}$ is displayed.
6. Press the □ key (about 2sec.), until the display goes out.
7. Release the □ key.

After a while (up to 40sec.) the display is reactivated. This completes the complete deletion. All cams are erased, and all system registers have the standard value.

6.2. Initialization

After an activation of the voltage supply or a complete deletion the CamCon is in the standard mode. This mode normally displays the rotational speed, the angular position of the encoder, or an error message. The error message continues to be displayed until the system registers have been adjusted to the encoder, provided the wiring is correct.

6.2.1. User keys for the system registers

In order to be able to program the system registers, the following key sequence must be maintained:

1. Press the — key four times.
2. Press the + key four times.
3. Keep the F key pressed for about 2 seconds, until the display shows $\text{□} \text{ } \exists \text{E} \text{ □}$.

6.2.2. The encoder resolution

The display $\square \square \square \square$ shows the resolution of the encoder in steps per rotation. The CamCon operates with a standard encoder with a resolution of 360 steps per rotation. The resolution cannot be adjusted or changed.

6.2.3. The F/R change over

After pressing the \square key the display shows $\square \square \square \square$. The display $\square \square \square \square$ shows that the encoder is counting upwards clockwise, when looking at the shaft. You can reverse the rotational direction of the encoder by pressing the \square or the \square key. $\square \square \square \square$ is displayed.

6.2.4. The zero point correction

If you press the \square key, the display shows e.g.: $\square \square \square \square$. **123** represents the current angular position of the encoder. After having positioned the drive to mechanical "0", you can also shift the current angular position to "0" by pressing the \square key or the \square key, so that the mechanical and the electronic zero point coincide. The display shows $\square \square \square \square$.

6.2.5. The dead time compensation

After you press the \square key the display shows $\square \square \square \square$. Here you enter the dead time within a range from 0ms to 255ms. You can change this value in steps of 1ms by pressing the \square or the \square key. The outputs 1 through 8 are (de)activated earlier by this time factor.

6.2.6. Setting of the programming mode

$\square \square \square \square$ appears on the display after you press the \square key. Here you can set the mode for cam programming. Pressing either the \square or the \square key results in a change over from programming mode 0 to programming mode 1. The programming mode 1 is easier to use than the programming mode 0, but it is not possible (in programming mode 1) to program several cams on one output.

You can leave the standard display with an additional pressing of the \square key. CamCon should now display the current speed, e.g.: $\square \square \square \square$. If not, please refer to the chapter 9. Troubleshooting.

6.3. Cam programming in programming mode "0"

6.3.1. Selecting a program

The cam programming and the program selection are initiated as follows:

Press the  for about 2 seconds, until the display shows e.g.: P A  . P A  means that e.g. program 0 is currently selected. By pressing the  or the  key, you have the possibility to select a program of 0 to 7. When the desired program number is adjusted, you can exit the 'Cam programming' mode by pressing the  key.

6.3.2. Selecting an output

To initiate cam programming press the  key for about 2 seconds, until the display shows e.g.: P A  . Press the  key again; the display shows e.g.: |  _ _ _ . This indicates that there is no programmed cam on output 1 in the 'Output selection' mode. By pressing the  key or the  key you can now select the output on which you want to program cams.

6.3.3. Searching for cams

By pressing the  key you leave the 'Output selection' mode |  _ _ _ and enter the mode 'Cam search' |  _ _ _ . In the 'Cam search' mode |  _ _ _ you can search for the cam activation points by pressing the  key. Every time the  key is pressed, CamCon searches the memory for activation points of the cams on the corresponding output. If no cam has been programmed, |  _ _ _ is displayed. If a cam has been programmed over the whole perimeter, the display shows |  _ _ _ .

6.3.4. Setting the preset value

You leave the 'Cam search' mode |  _ _ _ and enter the 'Preset' mode | | |  with the pressing of the  key. By pressing the  or the  key you can now select a value, e.g. 100. This value is the originator from which cams may either be reconstructed or erased by changing the activation and the deactivation points.

6.3.5. Shifting the activation point

By pressing the  key you leave the 'Preset' mode | | |  and enter the 'Activation point' mode |    . A pressing of the  key or the  key shifts the activation point by one step. This is done according to the following system:

A short single pressing of the  key will erase the activation point at the previously displayed preset value, e.g. 100, and then the preset value is increased by 1, e.g. to 101. A short pressing of the  key will lower the preset value (100 in our example) by 1 and then set a new activation point at e.g. 99.

6.3.6. Shifting the deactivation point

Pressing the  key once more leads you from the 'Activation point' mode  into the 'Deactivation point' mode . CamCon will first search for the deactivation point of the current cam (e.g.:  |  |  | ). By pressing the  or the  key the deactivation point is shifted by one step. This is done according to the following system:

A single short pressing of the  key will set a new switching point at the previously displayed preset value, e.g. 100. Then the preset value is increased by one, e.g. to 101. A short pressing of the  key will lower the preset value, e.g. 100, by 1 and then delete the switching point 99. The new deactivation point is then 99. A further pressing of the  key brings you back to the 'Output selection' mode  |  |  |  .

6.3.7. Leaving cam programming

No matter in which programming mode you are, you can always leave cam programming by pressing the  key. The standard display appears  |  .

6.3.8. Examples for cam programming in the programming mode "0"

6.3.8.1. Programming the first cam

Task:

After a complete deletion of the program memory and a successful initialization of the system, a cam shall be programmed in program 0 for output 2 from 100 to 200.

Solution:

1. Press the  key (for about 2 sec.), until you enter the 'Program selection' mode: P A 0 .
2. Press the  key (for about 2 sec.), you enter the 'Output selection' mode | 0 _ _ _ .
3. Press the  key to select output 2, 2 0 _ _ _ .
4. Press the  key, you enter the 'Cam search' mode 2 0 _ _ _ .
5. Press the  key, for the input of the preselection 2 1 1 | .
6. Press the  key and keep it pressed until 2 1 1 | 0 0 is displayed.
7. If you have released the  key too early or too late, you can adjust the preselection to 100 with the  or the  key.
8. Press the  key, the activation point is displayed.
9. Press the  key to program the deactivation point.
10. Press the  key and keep it pressed until the display shows 2 1 2 0 0 .

CAUTION! Do not keep the key pressed too long. It is best to keep the  key pressed until 190 and then adjust to 200 step by step.

11. Press the  key. You return to the standard display.

NOTE:

When programming the activation and the deactivation points you are programming "on line", i.e. if you keep the  key pressed for too long, the cam will be programmed too long. Although you can correct this subsequently with the  key, the range between the desired end of the cam and cams entered in excess is erased. All cams already programmed in this range are lost.

6.3.8.2. Programming additional cams on an output

Task:

A cam shall be programmed in program 0, on output 2 from 300 to 330 in addition to an already existing cam, e.g. from 100 to 200.

Solution:

1. Press the  key (for about 2 sec.), until you enter the 'Program selection' mode: P A 0.
2. Press the  key (for about 2 sec.), you enter the 'Output selection' mode | 0 _ _ _.
3. Press the  key to select output 2, 2 0 1 0 0. The display also shows the begin of the already programmed cam.
4. Press the  key, you enter the 'Cam search' mode 2 n 1 0 0.
5. Press the  key for the input of the preselection 2 1 1 1 0 0.
6. Press the  key and keep it pressed until 2 1 1 3 0 0 appears on the display.
7. If you have released the  key too early or too late, you can adjust the preselection to 300 with the  or the  key.
8. Press the  key, the activation point is displayed.
9. Press the  key to program the deactivation point.
10. Press the  key and keep it pressed until 2 L 3 3 0 is displayed.

CAUTION! Do not keep the key pressed too long. It is best to keep the  key pressed until 320 and then adjust to 330 step by step.

11. Press the  key. You return to the standard display.

NOTE:

When programming the activation and the deactivation points you are programming "on line", i.e. if you keep the  key pressed for too long, the cam will be programmed too long. Although you can correct this subsequently with the  key, the range between the desired end of the cam and cams entered in excess is erased. All cams already programmed in this range are lost.

6.3.8.3. Deletion of a particular cam

Task:

You want to delete the cam from 300 to 330 in program 0, on output 2.

Solution:

1. Press the  key (for about 2 sec.), until you enter the 'Program selection' mode: P A 0.
2. Press the  key (for about 2 sec.), you enter the 'Output selection' mode | 0 _ _ _.
3. Press the  key to select output 2, 2 0 1 0 0. The start of the first cam found is displayed.
4. Press the  key, you enter the 'Cam search' mode 2 n 1 0 0.
5. Press the  key, the device searches for the start of the next cam. 2 n 3 0 0 is displayed.
6. Press the  key. The preselection 2 | 3 0 0 is displayed.
7. Press the  key to program the activation point. The display shows 2 r 3 0 0.
8. Press the  key and keep it pressed until the display shows 2 r 3 3 0.

CAUTION! Do not keep the key pressed too long. It is best to keep the  key pressed until 320 and then adjust to 330 step by step.

9. Press the  key. You return to the standard display.

NOTE:

By shifting the cam activation point to the cam deactivation point the programmed cam is deleted. By shifting the activation point beyond the deactivation point deletes the range after the cam (e.g. from 330 to 350). All cams programmed in this range are deleted. A new cam will be placed between 330 and 350 when you move the activation point back to the desired position of 330 !

6.4. Cam programming in programming mode "1"

6.4.1. Selecting a program

The cam programming and the program selection are initiated as follows:

Press the  for, about 2 seconds, until the display shows e.g.: P A  . P A  means that e.g. program 0 is currently selected. By pressing the  or the  key, you have the possibility to select a program of 0 to 7. When the desired program number is adjusted, you can exit the 'Cam programming' mode by pressing the  key.

6.4.2. Selecting an output

If you press the  key during program selection, you enter the mode of the cam programming. The display shows e.g. |  _ _ _ . This indicates that no cam has been programmed on output 1 in the 'Output selection' mode. By pressing the  key or the  key you can now select the output on which you want to program cams.

6.4.3. Shifting the activation point

By pressing the  key you leave the 'Output selection' mode |  _ _ _ and enter the 'Activation point' mode |  _ _ _ . A pressing of the  key or the  key shifts the activation point by one step. This is done according to the following system:

A short single pressing of the  key will erase the activation point at the previously displayed preset value, e.g. 100, and then the preset value is increased by 1, e.g. to 101. A short pressing of the  key will lower the preset value (100 in our example) by 1 and then set a new activation point at e.g. 99.

6.4.4. Shifting the deactivation point

Pressing the  key once more leads you from the 'Activation point' mode |  _ _ _ into the 'Deactivation point' mode |  . CamCon will first search for the deactivation point of the current cam (e.g.: |  | ). By pressing the  or the  key the deactivation point is shifted by one step. This is done according to the following system:

A single short pressing of the  key will set a new switching point at the previously displayed preset value, e.g. 100. Then the preset value is increased by one, e.g. to 101. A short pressing of the  key will lower the preset value, e.g. 100, by 1 and then delete the switching point 99. The new deactivation point is then 99. A further pressing of the  key brings you back to the 'Output selection' mode |  _ _ _ .

6.4.5. Leaving cam programming

No matter in which programming mode you are, you can always leave cam programming by pressing the **F** key. The standard display appears $\square \square$.

6.4.6. Examples for cam programming in the programming mode "1"

6.4.6.1. Cam programming

Task:

After a complete deletion of the program memory and a successful initialization of the system, a cam shall be programmed in program 0 for output 2 from 100 to 200.

Solution:

1. Press the **↶** key (for about 2 sec.), until you enter the 'Program selection' mode: $P A \square$.
2. Press the **↶** key (for about 2 sec.), you enter the 'Output selection' mode $\square \square \square \square$.
3. Press the **+** key to select output 2, $\square \square \square \square$.
4. Press the **↶** key for the programming of the activation point $\square \square \square \square$.
5. Press the **+** key and keep it pressed until $\square \square \square \square$ is displayed.
6. If you released the **+** key too early or too late, you can adjust the preselection to 100 with the **-** or the **+** key.
7. Press the **↶** key to program the deactivation point.
8. Press the **+** key and keep it pressed until the display shows $\square \square \square \square$.
9. If you have released the **+** key too early or too late, you can adjust the deactivation point to 200 with the **-** or the **+** key.
10. Press the **F** key. You return to the standard display.

6.4.6.2. Deletion of cams

Task:

You want to delete the cam 100 to 200 on output 2 in program 0.

Solution:

1. Press the **↶** key (for about 2 sec.), until you enter the 'Program selection' mode: $P A \square$.
2. Press the **↶** key (for about 2 sec.), you enter the 'Output selection' mode $\square \square \square \square$.
3. Press the **+** key to select output 2, $\square \square \square \square$. The start of the found cam is displayed.
4. Press the **↶** key to program the activation point. The display shows $\square \square \square \square$.
5. Press the **+** key and keep it pressed until $\square \square \square \square$ is displayed.
6. If you released the **+** key too early, shift the deactivation point to 200 by repeatedly pressing the **+** key. If you released the **+** key too late, do not correct it ! The cam is then already erased. Shifting the activation point backwards programs a new cam in consequence. This cam should be deleted.
7. Press the **F** key. You return to the standard display.

7. Outline of operations

7.1. Switching the standard display

	2	33	Display of program and speed (min ⁻¹)
Press the  key shortly	P	235	Position display
Press the  key shortly	2	33	Display of program and speed (min ⁻¹)

7.2. Programming the system constants

	2	33	Display of program and speed (min ⁻¹)
Press the  key shortly	2	33	User key for system constants
Press the  key shortly	2	33	User key for system constants
Press the  key shortly	2	33	User key for system constants
Press the  key shortly	2	33	User key for system constants
Press the  key shortly	P	235	User key for system constants
Press the  key shortly	P	235	User key for system constants
Press the  key shortly	P	235	User key for system constants
Press the  key shortly	P	235	User key for system constants
Press the  key about 2 sec.	G	360	Encoder resolution
Press the  key shortly	r	123	Encoder F/R switching
Press the  key shortly	0	123	Zero point correction
Press the  key shortly	t	0	Dead time compensation
Press the  key shortly	P r	0	Cam programming mode
Press the  key shortly	2	33	Display of program and speed (min ⁻¹)

7.3. Cam programming

	2	33	Display of program and speed (min ⁻¹)
Press the  key about 2 sec.	P A	0	Program selection
Press the  key shortly	l a	100	Selecting an output
Press the  key shortly	l n	100	Searching for cam activation point (only in mode "0")
Press the  key shortly	l i	100	Enter position of preselection (only in mode "0")
Press the  key shortly	l r	100	Shifting the activation point
Press the  key shortly	l L	120	Searching for and shifting the deactivation point
Press the  key shortly	l a	100	Selecting an output
Press the  key shortly	2 a	300	Selecting the next output
Press the  key shortly	2	33	Display of program and speed display (min ⁻¹)

8. watch doc

The CamCon deactivates all output within 1ms when an error occurs. This behavior can be used as an extreme error message. Program a cam over the whole range of a chosen output (0 to 360 degrees) (security cam). This output should be slaved into the emergency deactivation circuit. To be able to program a security cam over the whole range.

After the security cam has been programmed, the display shows e.g.: .

9. Troubleshooting

Problem:

The display remains dark after activation.

Solution:

The wiring is probably not correct. Check the wiring.

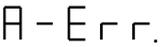
Problem:

The display shows: .

Solution:

Either the encoder is connected incorrectly or not at all, or the encoder resolution of the connected encoder does not coincide with the input encoder resolution. Check the wiring to the encoder or the input of the encoder resolution. When the error is corrected, press any key to clear the error message of the display.

Problem:

The display shows: .

Solution:

Your outputs are overloaded or have short circuited. Check the wiring and the connected power as well as any inductive loads, that are operated without a free wheel or a deletion unit. An output can supply up to 500mA of current. When the error is corrected, press any key to clear the error message of the display.



Caution: *Infavourable cable routing can lead to the deactivation of the outputs, since it builds up a potential that is redirected into the outputs at the closing of a contact. With induced loads the outputs have to be switched with a freewheeling diode. Covers or inductivities very close to the device inside the switchboard have to be switched with a deletion unit as do those that are wired to or influence the wiring of the device.*

10. Technical data of the CamCon

Multifunctional display for programming.....	7-segment, 5-digits, 13mm
Number of outputs.....	16
State display of the outputs.....	a red LED each
Number of programable cams.....	500
Number of programs.....	8
Cycle time, (switching speed).....	1ms
Dead time compensation (DTC).....	as blocks for outputs 1 to 8
Range of the DTC.....	0 to 255ms
Exactness of the DTC.....	+0 to -1 step
Encoder input.....	synchronous serial (SSI), gray coded
Encoder type.....	AAG60007
Encoder resolution.....	360 steps / rotation
Zero point correction.....	electronical adjustment inside CamCon
Rotatory direction of the encoder.....	is programmed by CamCon
Length of the connecting cable between encoder and CamCon.....	200m
Data security/memory.....	EEPROM
Supply voltage.....	24V DC \pm 20%
Encoder supply voltage.....	with 24V DC over supply voltage of CamCon
Current reception.....	200mA without encoder and outputs
Output current.....	500mA, short circuit proof permanent current (see 4.3. The outputs)
Output voltage.....	24V DC, pluse switching
Connections for:	
Encoder.....	through plug block clips
Voltage supply.....	through plug block clips
Cam outputs.....	through plug block clips
Operating temperature.....	0°C to +55°C
Cover type for:	
Front plate / full sight gate.....	IP 67 / IP 55
Cabinet.....	IP 40
Dimensions.....	see fig. on page 9
Front plate part.....	138 x 138mm + 1
Cabinet (switch plate cabinet by DIN 43700).....	144 x 144 x 63mm (WxHxD)
Cover of the front plate.....	Full sight gate, can be locked with security key
PC - connection.....	with PC30 Software package
Weight.....	about 600g

11. Keyword table

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