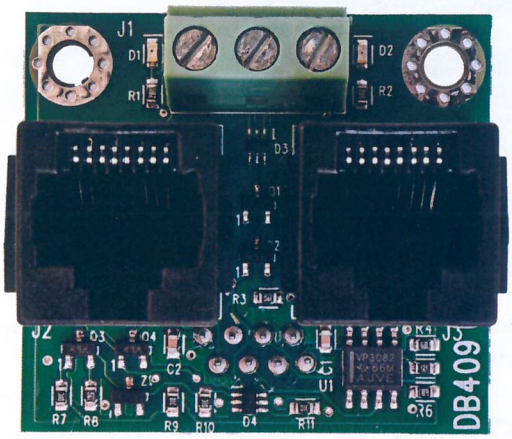


DAAB DB409 INSTRUCTION MANUAL FOR THE VFD-EL FREQUENCY CONVERTER

For the DAAB EP104 automatic control system version 4.08

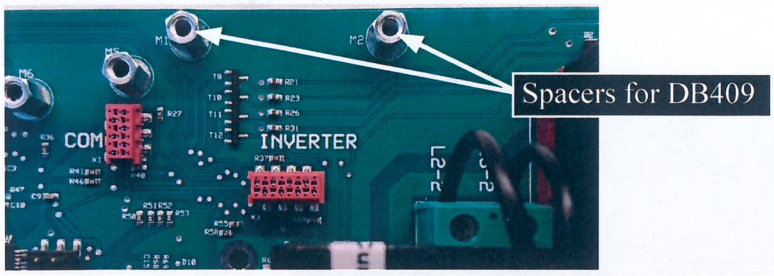
Revision 5

DAAB
WE OPEN DOORS FOR YOU

FAAC Nordic AB
BOX 125, SE-284 22 PERSTORP SWEDEN, +46 435 77 95 00, support@faac.se
www.faac.se

Installation

1. Disconnect the power to the EP104 board
2. Screw the DB409 card into place on the spacers on the EP104 using two M3x5 screws.



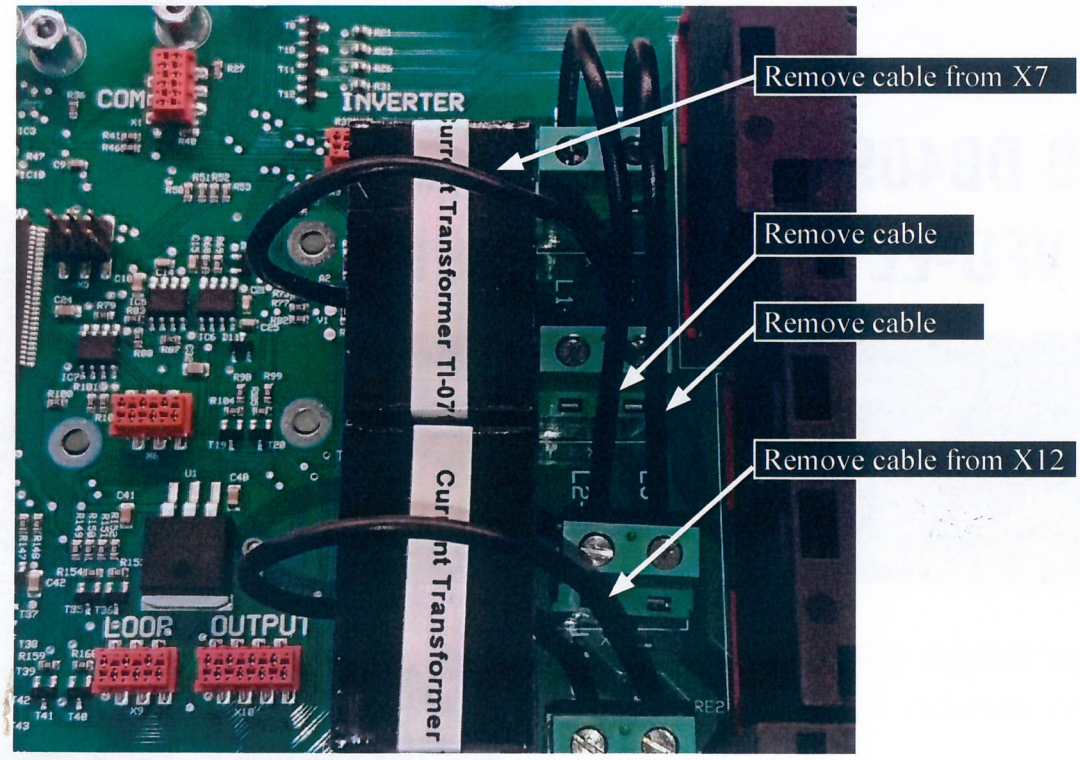
Precautions before connection

NOTE! Make sure that all cables, marked in the figure below, are removed. If this is not done correctly, the frequency converter and control automatics risk being permanently damaged.

Remove the following cables:

EP104-1	EP104-2
Cable in X12	Cable in X12
	Cable in X7
	Cables between X4 and X11

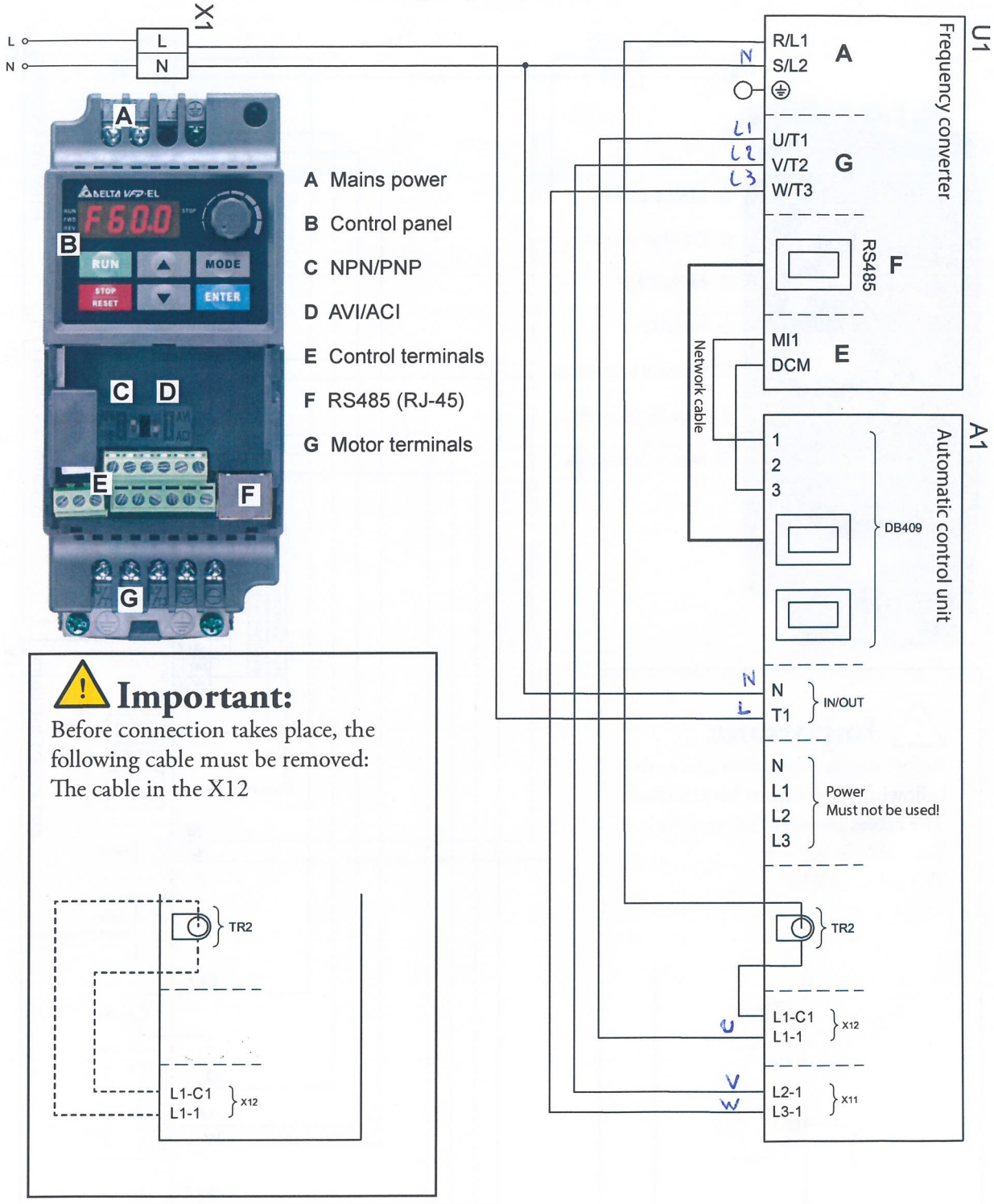
The picture is showing EP104-2



Connection

The frequency converter to be connected to the DB409 must be of the DELTA VFD-EL type. It is a drive with negative logic. For complete connection of signals and connection of electric motors see the following pages.

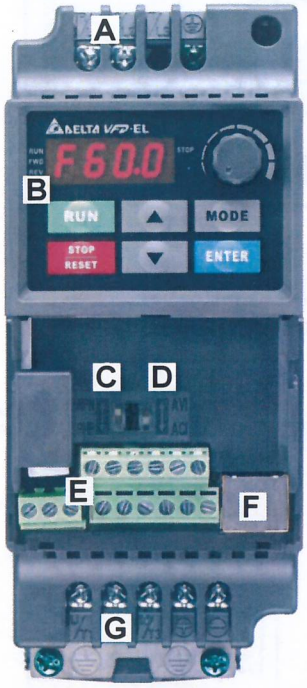
• Wiring diagram for one motor



Important:

Before connection takes place, the following cable must be removed:
The cable in the X12

- Circuit diagram for two motors



A Mains power

B Control panel

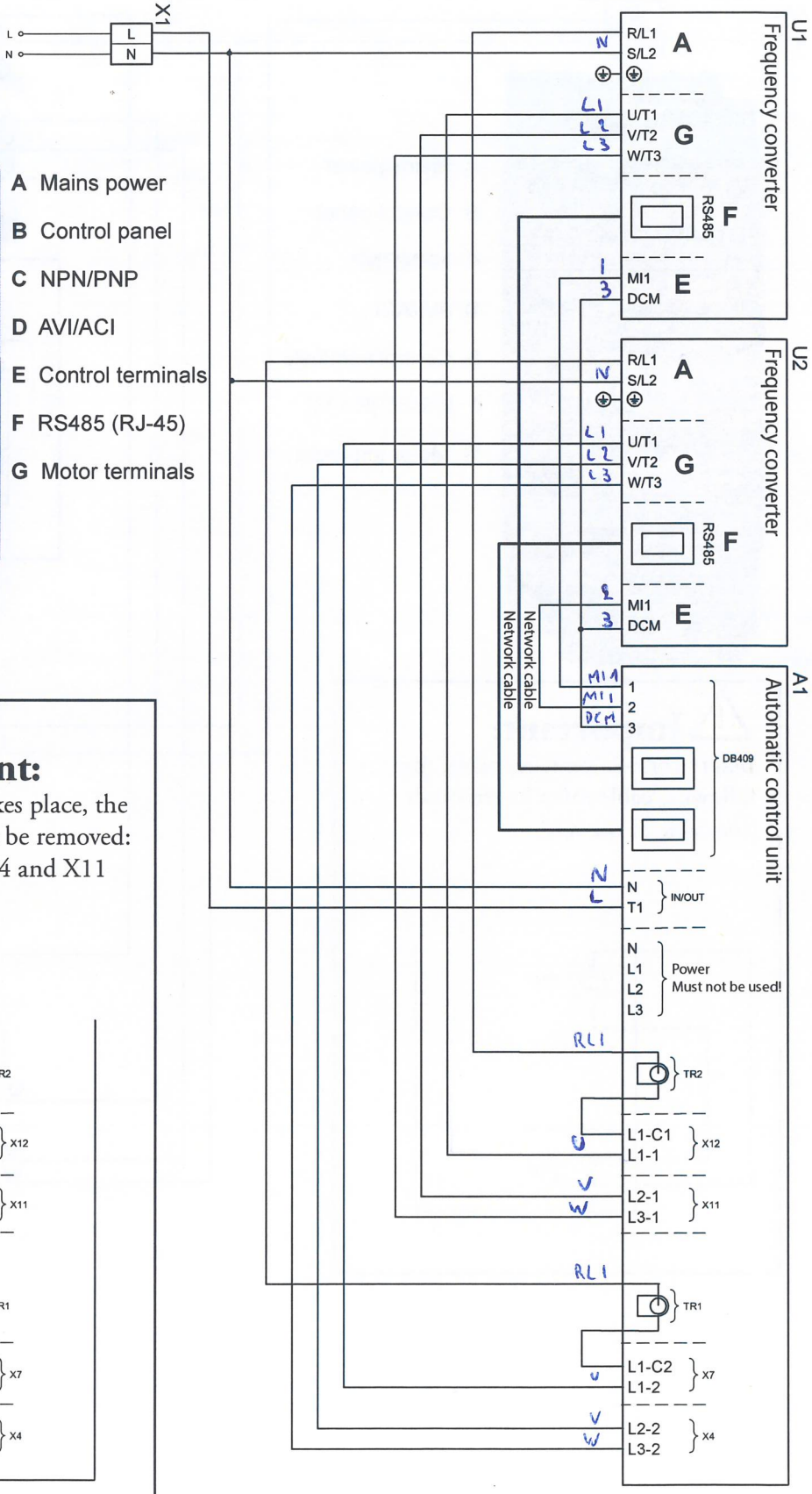
C NPN/PNP

D AVI/ACI

E Control terminals

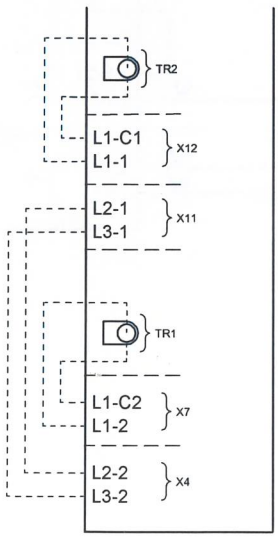
F RS485 (RJ-45)

G Motor terminals



Important:

Before connection takes place, the following cables must be removed:
The cables between X4 and X11
The cable in X7
The cable in X12



Installing the Delta VFD-EL frequency converter

• Modification of the motor winder

The following criteria must be met in order to use the DAAB motor winder with the frequency converter:

- If mechanical limit switches are used, the limit switch cams must be wider than normal.
- FAAC Nordic AB recommends using encoder-type limit switches, DB405, together with the frequency converter.
- FAAC Nordic AB recommends using a motor with a speed of 2,800 rpm.

• Programming the frequency converter

To program the frequency converter, press ENTER once to select programming mode. Select program group 00-xx to 11-xx using the arrow keys. Press ENTER to select program group. The program arrows now switch between the different program channels in the selected program group. Press ENTER once more at the selected program channel and select value using the arrow keys. When you have set the desired value, press ENTER again to save the new value. When all the programming has been done, you return to normal operation by pressing MODE until the display shows H for the output frequency concerned. Tip: By pressing MODE once more when stepping between the program channels, you change to stepping between the program groups instead.

• Channel settings in the frequency converter

Channel no.	Description	Factory setting	Modified value
00.03	used to display the output frequency during operation after power is switched on.	01	
01.00	used to set the maximum output frequency	100.0	
01.03	used to set the low frequency	5.00	
01.04	used to set the low frequency voltage	40.0	
01.05	used to set the start frequency	1.50	
01.06	used to set the start frequency voltage	30.0	
02.00	used to set where the setpoint value for speed is to be taken from	03	
02.01	used to set the start method	01	
02.02	used to set the type of stop	01	
02.04	used to block reversing	01	
03.00	used to set the multifunction output	01	
03.08	used to set the internal cooling fan	01	
04.04	used to set the function of input MI1	00	
06.01	used to set the current limit at speed increase	200	
06.02	used to set the current limit at constant speed	200	
06.06	used to set the electronic overload relay	02	
09.00	selects communication address: 1 for motor 1, 2 for motor 2	1	
09.01	used to set transfer speed	03	
09.02	used to set error handling	0	
09.07	used to set time delay between messages	0	

• Channel settings in the EP104 when using an encoder, DB405

For the EP104 to measure current and power correctly, C202 must be set to 4, frequency converter.
When a frequency converter is used with the EP104, load guard with personal protection cannot be used. When C202 is set to 4, personal protection is automatically turned off and channels C230 and C240 are hidden.
Depending on the selected setting in C200, the values in C211, C212, C232, C233, C242 and C243 may need to be adjusted, so that a proper function and a secure mechanical protection for the gate or door is achieved.

A basic setting for the internal protection of the motor is 4.0A in channels C252, C253, C262 and C263 and 5.0 seconds in channel C221. Adjust the settings so that a proper function and a secure protection of the motors is achieved.
When a frequency converter is used, only the upper limit is active for the internal motor protection. This limit is 50% higher than the set value. If 4.0A is specified then the actual current limit is 6.0A. If the current is above this limit for the specified time in C221, the control will stop and display the fault code E201 for motor 1 or E202 for motor 2.

As of program version 4.07, a new category of channels has been added, F-channels. In these channels, settings are made for how the frequency converter is to work together with the EP104.

If there are problems with communication or when communication is disabled, via F001, the frequency converters can be operated in hold-to-run at the same speed in both opening and closing, by changing channel 02-00 on the frequency converter to a 4 for the rotatory actuator or 0 to use the arrow keys to adjust the F-value. Note that when the rotatory actuator is turned clockwise the output frequency increases, so start by turning it to the maximum extent anticlockwise and then increase to a suitable output frequency. If communication errors occur or if communication is disabled, the motors can only be operated using hold-to-run. In hold-to-run in this mode, no ramping down takes place before open or closed position is reached. For this reason, adjust the speed and pay attention when the open or closed position is close.

For the speed settings in F012, F013, F022 and F023 to work, the ratio of the motor winder must be specified in the following channels:
F030 = motor winder connected to motor 1.
F040 = motor winder connected to motor 2.

Until ratio has been selected in these channels, maximum speed will be limited to 25Hz. If the ratio is not stated in the documentation belonging to the motor winder, a measurement can be done by displaying channel F031 or F041 and then letting the motor winder open or close until a value appears in these channels after approx. 6 seconds. Compare this value with the values specified in the instruction manual for channel F030 or F040 and specify the corresponding figure in both these channels.

It is specified in channels F002, F003 and F004 how quickly the gate or door is to reach its opening or closing speed.
F002 = Acceleration from fully closed position.
F003 = Acceleration in all other starts. To obtain an even and jerk-free start in the fully open position, the time in F003 must be adjusted for this particular start.
F004 = Acceleration when P500 is programmed to 2, Battery backup, and activated.

It is specified in channels F005 and F006 how quickly the gate or door is to stop.
F005 = Retardation time for limit switches and change of direction.
F006 = Retardation time for photocell and vehicle loops.

The times in these four channels refer to a speed which is 100Hz, i.e. the times apply when the speed is 100Hz. If the speed is lower, for example 50Hz, the time will be halved, but the force in deceleration and speed increase will be the same regardless of speed. If the times increase, the forces on the gate or door decrease in changes of speed.

The factory settings are adapted to a hinged gate with a 6 metre opening. Check that the gate accelerates without subsequent swings from both the closed and open positions. Increased times reduce the risk of swings. Check also that the gate slows down gently and without jerking in the open and closed positions. With the photocell or vehicle loop activated, deceleration must take place so that no collision between the gate and the vehicle can occur. Check and adjust the time in F006.
In the case of a sliding gate, the value must be specified in F002 and F003. Adapt the acceleration to the size and weight of the gate. A reasonable starting value is 5.0 seconds. The retardation in F005 and F006 is adjusted in the same way as above.

The readout channels in L114, L115, L124 and L125 cannot be adjusted when the C202 has been chosen for 4 frequency converters. These channels show the calculated angle, before the limit, where the motors will go down to low speed in accordance with F008 and F009. This calculated angle depends on speed, slow speed, retardation and chosen ratio. The angles in these channels are calculated continuously on the basis of these parameters. If stopping at the specified angle for open or closed position takes place too abruptly, there is a possibility of adding a certain angle to the values in these channels. This extra deceleration angle is specified in channels F014, F015, F024 or F025.

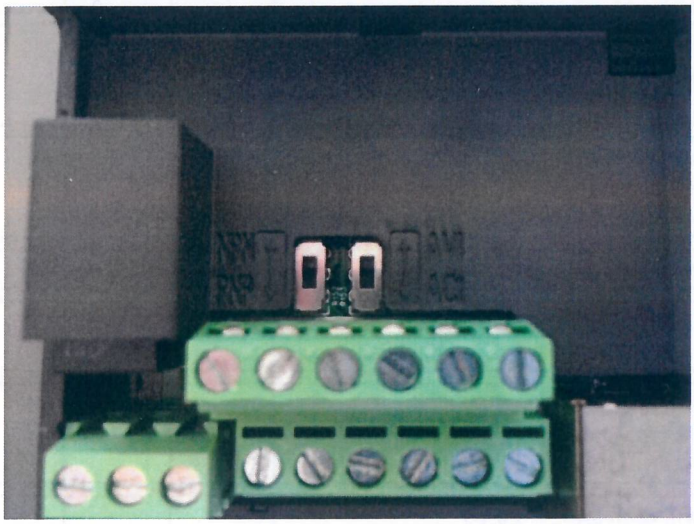
• Channel settings in the EP104 when using mechanical limit switches

In the case of mechanical limit switches, no ramp-down angles are calculated and suitable ramp-down times must instead be tested in commissioning.
Channels C422, C423, C432 and C433 specify how many seconds after the limit position has been activated the motor should run at low speed according to channels F008 and F009. Note, however, that if the time in F005 is long in relation to the times specified, the gate may perhaps not reach the speed specified in F008 and F009. For that reason, check the current output frequency by pressing the MODE button until the display begins with H.
C422 = 1,50 - This parameter specifies a run-on time in opening movement for motor 1
C423 = 1,50 - This parameter specifies a run-on time in closing movement for motor 1
C432 = 1,50 - This parameter specifies a run-on time in opening movement for motor 2
C433 = 1,50 - This parameter specifies a run-on time in closing movement for motor 2

A basic setting for the internal protection of the motor is 4.0A in channels C252, C253, C262 and C263 and 5.0 seconds in channel C221. If 1.5 kW output drives are used, channels C252, C253, C262 and C263 are set to 6.0A. Adjust the settings to ensure proper operation and secure protection for the motors.

• Setting of the frequency converter

Note that the switches above the terminal block must be in the upward position! (NPN/AVI)



- Channel list, Frequency converter, F-channels

No.	Name		Range	Factory	Setting	Ref. page
F001	Communication with frequency converter		0 - 1	1		
	0	Communication disabled				
	1	Communication activated				
F002	Acceleration time from closed position from 0-100Hz		0.5-9.9 seconds	2.0 sec		
F003	Acceleration time from all positions except closed position from 0-100Hz		0.5-9.9 seconds	4.0 sec		
F004	Acceleration time when P500 is set to 2 and the input is activated, battery backup		5.0-12.0 seconds	7.0 sec		
F005	Retardation time at open and close position and at change of direction from 100-0Hz		0.5-9.9 seconds	4.0 sec		
F006	Retardation time at photocell and vehicle loops from 100-0Hz		0.5-9.9 seconds	2.0 sec		
F008	Low-speed frequency for opening movement		5-20 Hz	5 Hz		
F009	Low-speed frequency for closing movement		5-20Hz	10 Hz		
F012	Opening frequency / Opening speed for motor 1		21-99Hz	50Hz		
F013	Closing frequency / Closing speed for motor 1		21-99Hz	30Hz		
F014*	Increase in limit in L114 as speed will decrease during the opening movement, motor 1. (Only when using a frequency converter)		0-60	0		
F015*	Increase in limit in L115 as speed will decrease during the closing movement, motor 1. (Only when using a frequency converter)		0-60	0		
F022	Opening frequency / Opening speed for motor 2		21-99Hz	50Hz		
F023	Closing frequency / Closing speed for motor 2		21-99Hz	30Hz		
F024*	Increase in limit in L124 as speed will decrease during the opening movement, motor 2. (Only when using a frequency converter)		0-60	0		
F025*	Increase in limit in L125 as speed will decrease during the closing movement, motor 2. (Only when using a frequency converter)		0-60	0		

F-channels are only viewed if C202 is set to 4, frequency converter

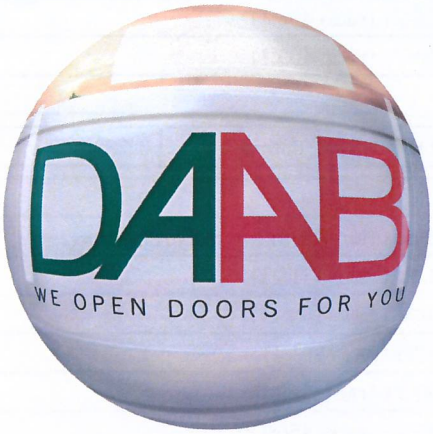
F030	Choice of ratio for motor 1		0 - 7	0		
	0	Not selected, in this position the motor only rotates at 25Hz				
	1	MK with pulleys 40/71 (ratio 1318:1)				
	2	MK with pulleys 50/71 (ratio 1098:1)				
	3	MK with pulleys 71/71 (ratio 791:1)				
	4	MK with pulleys 100/71 (ratio 565:1)				
	5	MK with pulleys 125/71 (ratio 456:1)				
	6	MK with pulleys 140/71 (ratio 409:1)				
	7	MT (ratio 791:1)				

F031	Measured ratio motor 1. Only when F030=0.	0-2000	0		

F040	Choice of ratio for motor 2		0 - 7	0		
	0	Not selected, in this position the motor only rotates at 25Hz				
	1	MK with pulleys 40/71 (ratio 1318:1)				
	2	MK with pulleys 50/71 (ratio 1098:1)				
	3	MK with pulleys 71/71 (ratio 791:1)				
	4	MK with pulleys 100/71 (ratio 565:1)				
	5	MK with pulleys 125/71 (ratio 456:1)				
	6	MK with pulleys 140/71 (ratio 409:1)				
	7	MT (ratio 791:1)				

F041	Measured ratio motor 2. Only when F040=0.	0-2000	0		

* = Appears only when L001 and/or L002 are set to 1 encoder.
F-channels are only viewed if C202 is set to 4, frequency converter



FAAC