ELIN EBG
Elektronik

ELVO*vert* PX

Operating, Service

Projecting, Mounting & Connecting

8074627.02/02

Sicherheitshinweise

Folgende Symbole werden Sie durch die Anleitung begleiten:


Allgemeiner Hinweis, Unbedingt beachten !


Gefährliche Spannungen ! Lebensgefahr !


Messung, Kontrolle !


Hinweis, Tip !


Bedienung über das Bedienfeld !


Beispiel !

Voraussetzung für eine erfolgreiche Inbetriebnahme sind eine korrekte Geräteauswahl, Projektierung und Montage. Sollten Sie in diesem Zusammenhang weitere Fragen haben, so wenden Sie sich bitte an Ihre Vertriebsstelle oder direkt an den Lieferanten des Gerätes.

Kondensatorentladung !

Vor Arbeiten am Gerät ist nach dem Freischalten vom Netz die Kondensatorentladezeit von mindestens 5 Minuten abzuwarten (Ladekontroll-LED auf der Platine !!), um sicherzustellen, daß das Gerät völlig spannungsfrei ist.

Automatischer Wiederanlauf !

Bei bestimmten Parametereinstellungen kann es vorkommen, daß der Frequenzumrichter nach einem Ausfall und anschließender Netzzuschaltung automatisch wiederanläuft. Stellen Sie sicher, daß dadurch weder Personen noch Einrichtungen gefährdet sind.

Inbetriebnahme und Service !

Arbeiten am Gerät dürfen nur von dafür qualifizierten Personen unter Beachtung der gültigen Bedienungsanleitung und Vorschriften erfolgen. Im Fehlerfall können auch betriebsmäßig potentialfreie Kontakte und/oder Baugruppen gefährliche Spannungen führen. Um eine Gefährdung auszuschließen, sind die Vorschriften "Arbeiten unter Spannung" zu beachten.

Lieferbedingungen:

Unseren Lieferungen und Leistungen liegen die "Allgemeinen Lieferbedingungen der Elektro- und Elektronikindustrie Österreichs" neuester Ausgabe zugrunde.

Angaben in dieser Anleitung:

Es ist unser Bestreben, unsere Erzeugnisse ständig zu verbessern und jeweils dem neuesten Stand der technischen Entwicklung anzupassen. Änderungen der Angaben in dieser Anleitung, insbesondere von Maßen und Abmessungen, bleiben daher jederzeit vorbehalten. Die Projektierungshinweise und Anschlußbeispiele sind unverbindliche Vorschläge, für die wir insbesondere deshalb keine Gewähr übernehmen können, da die anzuwendenden Bestimmungen von Art und Ort der Installation und Verwendung der Geräte abhängen.

Vorschriften:

Der Anwender hat sicherzustellen, daß das Gerät sowie zugehörige Komponenten nach den jeweils gültigen Vorschriften verwendet werden. Der Einsatz dieser Geräte in Wohngebieten ist ohne besondere Maßnahmen zur Funkfrequenzentstörung nicht zulässig.

Schutzrechte:

Wir bitten zu beachten, daß keine Gewähr dafür übernommen wird, daß die hier beschriebenen Schaltungen, Geräte und Verfahren frei von Schutzrechten sind.

Bewahren Sie diese Anleitung in Gerätenähe jederzeit griffbereit auf !

Safety instructions

The following symbols should assist you in handling the instruction:


General information, note exactly !


Dangerous voltages ! Danger of life !


Measurement, control !


Advise, tip !


Keypad operation !


Example !

The requirements for a successfull commissioning are a correct selection of the unit, projection and mounting. In case of further questions, please contact the supplier or call the manufacturer of the unit directly.

Capacitor discharge !

Before any work on or in the unit, disconnect from the mains and wait at least 5 minutes until the D.C.link capacitors have been fully discharged. Check that the device is no longer alive by measuring the voltage at the D.C.link capacitor.

Automatic restart !

In case of certain parameter adjustments it may happen that the frequency inverter starts up automatically after switching on the mains again. You have to guarantee, that no person and no other equipment is in danger.

Commissioning and service:

Works on or in the unit must only be undertaken by properly qualified staff in full compliance of the appropriate instructions and pertinent regulations. Note that a fault may cause potential-free contacts and/or PCBs to carry mains potential. To avoid any risk to humans, obey the regulations concering "Work on Live Equipment" explicitly.

Delivery conditions:

Our deliveries and services are based on the "General Terms of Delivery of the Austrian Electrical Industries" latest edition.

Specifications in this instruction:

We are constantly striving to improve our products and adapt them to the latest state of technical development. We therefore reserve the right to modify the specifications given in this instruction at any time, particulary those refering to measures and dimensions. All planning hints and connecting samples are non-binding suggestions, for which we are unable to assume any liability, particulary since the regulations to be complied with depend on the type and location of the plant and on the use of the instruments.

Regulations:

It is the users responsibility to ensure that the instrument and its component parts are used in compliance with applicable regulations.
It is not permitted to use these instruments in residential areas without special measures to supress radio frequency interferences.

Patent and Trade Marks:

Please note that we do not guarantee any connections, instruments or processes described herein to be free from patent or trademark right of third parties.

Keep this instruction near the unit to hand !

Operating & Service
Projecting, Mounting & Connecting

ELVOvert PX

0,4 to 2,2 kW, 1 AC 220 to 240 V
1,5 to 4,0 kW, 3 AC 380 to 460 V

8 074 627.02/02 / December 1998

This documentation covers themes on operating, service, projecting, mounting and connecting.
It consists of the two main parts operating & service and projecting, mounting & connecting.

Regulations for the observance of the CE-directive and the new Power-Drive-Standard (EN 61800-3) are described in the instruction manual „Additional installation regulations PX, SX“ (Cat.no. 8074578).

In case of damage or incomplete delivery, please inform the supplier or the insurance company.
The manufacturer declines responsibility for faults occurring during transport or unpacking.

Notes

Operating & Service

ELVO*vert* PX

0,4 to 2,2 kW, 1 AC 220 to 240 V
1,5 to 4,0 kW, 3 AC 380 to 460 V

This part of the documentation covers chapters on operating and service. Details for projecting, mounting and connecting can be read on page 27ff.

Regulations for the observance of the CE-directive and the new Power-Drive-Standard (EN 61800-3) are described in the instruction manual „Additional installation regulations PX, SX“ (Cat.no. 8074578).

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Operation via the built-in keypad:

Description of the keypad

LED display:
Shows frequency, motor-current, DC link voltage, motor rotation and type

FUNC key:
Selects a parameter or is used to store a changed parameter value.

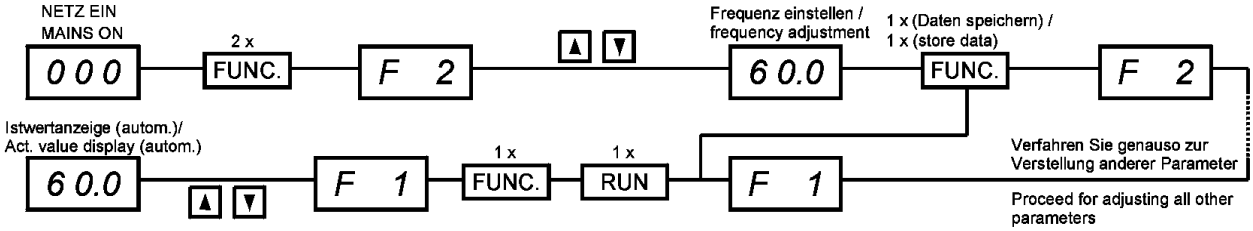
POWER-LED:
Shows if the electronic is working; Attention: Use the charge-LED (right beside the terminals) to check the charging condition of the DC link.

UP/DOWN key:
Changes the value of a parameter or increases / decreases the frequency.

RUN key:
Starts the inverter (only in the keypad mode). Not functional if terminal RUN is activated.

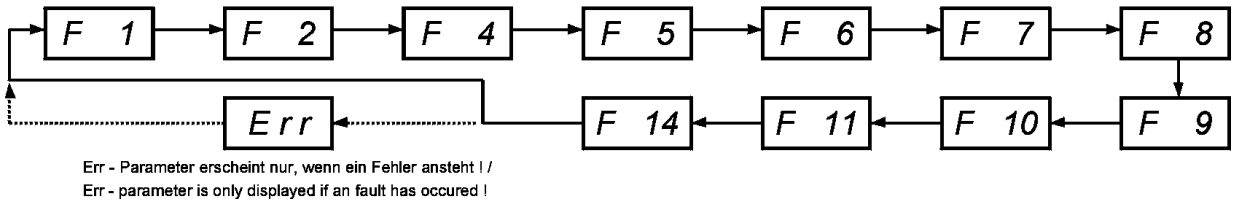
STOP/RESET key:
Stops the inverter or resets a trip (functional in both keypad and terminal mode but not in the case when parameters in the 2nd level of operation are selected).

Programming example for adjusting the frequency and starting the inverter



Overview of the 1st level of operation

FUNC key:
Selects a parameter or stores a changed parameter value (see programming example).
Every time the FUNC key is pressed, the display changes as follows:



Changing parameter values in the 1st level of operation

1) First select the corresponding parameter with the FUNC key.
2) The UP or DOWN key jumps to the adjusting mode and shows the actual value.
3) With the UP/DOWN keys the new value can be adjusted.
4) The FUNC key stores the value and jumps back to the 1st level of operation.

Selecting and changing a parameter in the 2nd level of operation

1.) Select the parameter F14 with the FUNC key.
2.) Select the corresponding parameter with UP/DOWN. It is shown without "A" or "C".
3.) Pressing the FUNC key shows the parameter with "A" or "C" in front.
4.) UP/DOWN will change the value.
5.) FUNC stores the value and jumps back to the display of parameter numbers.
6.) Pressing FUNC a second time jumps back to the 1st level of operation, showing F14.

Remarks to the display

1.) The parameter which was active before switching off the mains voltage is displayed after switching on again.
2.) Parameter in the 1st level of operation (F1-F14, Err) are always displayed in their correct way that means "F1", "F2", ... a.s.o.
3.) Parameter in the 2nd level of operation (A0, A1, ...) are displayed according to the table on pages 6-7 with their parameter number but without "A" or "C" in front. In case of "C0 - C4" and C10, C20 C21 the number and a point in front is displayed (i.e. ".10" for C10)

Parameter

Overview of the 1st level of operation

Parameter	No.	Range	Fd.	See Page
Actual values	F1	Freq., motor curr., U_{DC}, direction	None	9
Frequency ref.value, preset speeds	F2	0.0 to A63 (+A3) Hz	0.0 Hz	9
Motor direction pre-selection	F4	F/r (FWD/REV)	F	9
V/f characteristic selection	F5	0 to 57	1.)	10
1st acceleration time	F6	0.1 to 999 s	2.)	11
1st deceleration time	F7	0.1 to 999 s	2.)	11
Voltage boost	F8	0 to 99 %	11	11
Operating mode: Ref.value, Start, Stop	F9	0 to 3	03	11
Analogue meter adjustment	F10	1 to 99	72	12
Motor nominal voltage	F11	200 to 480 V 3.)	4.)	12
2nd level of operation	F14	1 to 72	A0 5.)	12
Trip memory	Err	all trips	None	12

1.) 08 for 220 Volt units, 00 for 400 Volt units

2.) 10 s for 220 Volt units, 15 s for 400 Volt units

3.) for 220 Volt units: 200, 220, 230 or 240

for 400 Volt units: 380, 400, 415, 440, 460 or 480

4.) 220 for 220 Volt Geräte, 380 for 400 Volt Geräte

5.) Only in the factory default setting (FD) and only if selected the first time, F14 will show A0. In all other cases the last adjusted parameter is displayed under F14.

Overview of the 2nd level of operation

In the 2nd level of operation parameters cannot be adjusted during running !

Parameter	No.	Range	Default	See Page
Operating method	A0	0 to 2	0	13
Motor capacity	A1	0.37 to 5.5	1.)	13
Pole number	A2	2 / 4 / 6 / 8	4	13
fMAX increase	A3	0.0 to 15 Hz	0.0	13
Starting frequency	A4	0.5 to 5.0 Hz	0.5	13
fMAX limitation	A5	0.0 to A63 (+A3) Hz	0.0	14
fMIN limitation	A6	0.0 to A63 (+A3) Hz	0.0	14
Skip frequency 1	A7	0 to 375 Hz	0	15
Skip frequency 2	A8	0 to 375 Hz	0	15
Skip frequency 3	A9	0 to 375 Hz	0	15
Carrier frequency	A10	5 / 8 / 12 / 16 kHz	16	15
Frequency command sampling	A11	1 to 8	8	15
Preset speed 1	A12	0 to A63 (+A3) Hz	0	15
Preset speed 2	A13	0 to A63 (+A3) Hz	0	15
Preset speed 3	A14	0 to A63 (+A3) Hz	0	15
Preset speed 4	A15	0 to A63 (+A3) Hz	0	15
Preset speed 5	A16	0 to A63 (+A3) Hz	0	15
Preset speed 6	A17	0 to A63 (+A3) Hz	0	15
2nd acceleration time	A18	0.1 to 999 s	10.0	15
2nd deceleration time	A19	0.1 to 999 s	10.0	15
DC brake: fSTART	A20	0.5 to 375 Hz	0.5	16
DC brake: Power	A21	0 to 36 (400 V: 0 to 20)	0	16
DC brake: Time	A22	0 to 600 s	0	16
Electronic motor protection	A23	20 to 120 %	100	16
Motor protection characteristic	A24	0 / 1	1	16
Ext. fREF: start value	A26	0 to A63 (+A3) Hz	0	17
Ext. fREF: end value	A27	0 to A63 (+A3) Hz	0	17
Acceleration: Linear or s-ramp	A28	0 / 1	0	17
Deceleration: Linear or s-ramp	A29	0 / 1	0	17
Overcurrent signal: Adjustment	A30	50 to 150 %	150	17
Current limitation: Adjustment	A31	50 to 150 %	150	18
Current limitation: Content	A32	0 / 1	0	18
LAD function: ON / OFF	A33	0 / 1	0	18
Restart selection	A34	0 / 1	0	19
U<< detection: YES / NO	A35	0 / 1	0	19
AVR at deceleration: Y / N	A36	0 / 1	0	19
UMOTOR at DECEL	A37	200-270 / 380-540 V / 000	220/380	19
Braking unit: Switch-on time	A38	0.1-30.0, 31.0	5	19
Frequency arrival signal: on-level	A39	0 to 100 %	100	20
Frequency arrival signal: off-level	A40	0 to 100 %	100	20
FWD lock: ON / OFF	A41	0 / 1	1	20
REV lock: ON / OFF	A42	0 / 1	1	20
STOP key: ON / OFF	A43	0 / 1	0	20
Analogue input: 0-5 V / 0-10 V	A48	0 / 1	0	20
Frequency arrival signal: Characteristic	A49	1 / 2	2	21
Analogue / digital signal	A50	0 / 1	1	21
Analogue output: frequency / current	A51	0 / 1	0	21
RUN message selection	A52	1 / 2	1	21
fREF changeable at softlock	A53	0 / 1	0	21
DC braking: ON / OFF	A55	0 / 1	0	21
DC braking: selection	A56	0 / 1	1	22
Clear trip memory Y / N	A57	0 / 1	0	22
Start with reduced voltage	A58	0 / 1	1	22

Parameter	No.	Range	Default	See Page
Base frequency	A62	50 to A63 Hz	50	23
End frequency	A63	50 to 120 (360) Hz	50	23
Maximum frequency	A64	0 / 1	0	23
Skip frequency range	A68	0.0 to 9.9 Hz	0.5	23
Preset speed 7	A71	0 to A63 (+A3) Hz	0	23
fREF: Voltage calibration	A80	0 to 255	2.)	23
fREF: Current calibration	A81	0 to 255	2.)	23
Allowed undervoltage time	A82	0.3 to 3.0 s	1.0	24
Waiting time for restart	A83	0.3 to 100 s	10.0	24
Softlock: ON / OFF	A84	0 / 1	0	24
Deceleration time for current limitation	A85	0.3 - 31.0 s	1.0	24
Setting for input 1	C0	0 to 12	1	25
Setting for input 2	C1	0 to 12	2	25
Setting for input 3	C2	0 to 12	7	25
Setting for input 4	C3	0 to 12	11	25
Setting for input 5	C4	0 to 12	0	25
Setting fore output 11	C10	00 to 02	0	25
Inputs 1-5: inversion	C20	00 to 1F	00	26
Output 11 and relay: inversion	C21	00 to 03	03	26

1.) The most used motor power is pre-adjusted.

2.) The factory default setting is pre-adjusted.

Commissioning

Before working with the equipment check the following points:

1) Check if the power supply and the motor lines are correct connected.
2) Are the control cables connected to the right terminals?
3) Is the frequency inverter grounded and mounted correctly?
4) Remove all stray pieces of wire, solderless terminals or other objects left from wiring work.
5) Make sure that there are no loose screws or terminals.
6) Make sure that the maximum frequency setting matches the machine specifications.

Factory default setting (initialisation)

All frequency inverters ELVOvert PX are initialized, that means they are pre-adjusted with their factory default setting. The units can be set back to the initial state at any time.

Here is the procedure to set back the inverter to its factory default setting:

1) Programm one of the inputs 1-5 with the parameters C0 - C4 to STN (setting: 05).
2) Interconnect the programmed terminal with PV24 (either with a switch or a piece of wire).
3) Switch of the mains voltage.
4) Switch on the mains voltage again after the DC link control LED has gone off.
5) Wait for app. 6 s and then open the interconnection between STN and PV24.

Remarks
The factory default setting can be done also by releasing a reset.
Programm a second input with RS (setting: 11).
In both cases (mains OFF/ON or reset) wait for app. 6 s, to make sure that the frequency inverter is correctly initialized.
If the softlock is active it is not possible to do a factory default setting.

Commissioning via the built-in keypad

It is possible to control the inverter via the keypad without connecting any control terminals.

1) Switch on the mains voltage. The power LED is illuminated.
2) Select the parameter F9 by pressing the FUNC key and adjust „00“ with the arrow keys.
3) Store the new setting by pressing FUNC once more.
4) Now select the parameter F2.
5) Adjust the frequency you need with the arrow keys.
6) Start the inverter with the RUN key.
7) Stop the equipment with the STOP/RESET key.

Check the following points after commissioning:

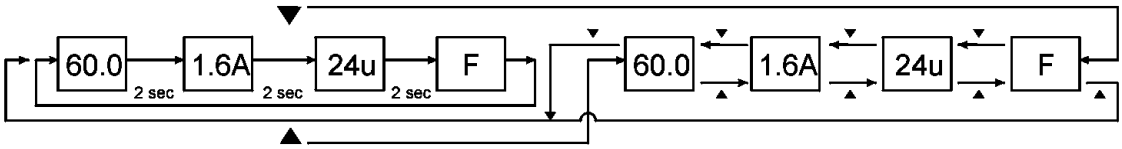
1) Was the rotation direction of the motor correct?
2) Did an error message occur during acceleration or deceleration?

   Increase the acceleration time (deceleration time) in case of overcurrent trips (overvoltage trips).
3) Were there any abnormal motor vibrations or noise?

Description of the 1st level of operation:

F1	Actual values	Frequency, Motor current, DC link voltage, motor direction	Fd.: none Stand still: 000

This parameter shows frequency, output current, DC link voltage and motor direction in a 2-second interval. If one of the arrow keys is pressed during this interval, the alternating display changes into a steady display (starting with the frequency), which can be cycled with the arrow keys. The display jumps automatically back to the interval mode after the last value was displayed (frequency or motor direction).



F2	Frequency ref.value, Preset speeds	0.0 - A63 (+ A3) Hz (max. 375 Hz)	FD: 0.0

Frequency reference value:
Sets the output frequency of the frequency inverter. Change with the arrow keys.
The value changes in 0.1 Hz steps in the range 0 to 99.9 Hz and in 1 Hz steps in the range 100 to 360 Hz.
Pressing once increases/decreases the value by 1 unit, durable pressing increases/decreases continuously.

Preset speeds (alternative to the direct adjustment of the parameters A12, A13, ...):
Sets the frequency for the preset speeds 1 to 7, if they are assigned to the programmable inputs 1-5.

Preset speed	SW1	SW2	SW3
Preset 1	ON	OFF	OFF
Preset 2	OFF	ON	OFF
Preset 3	ON	ON	OFF
Preset 4	ON	OFF	ON
Preset 5	OFF	ON	ON
Preset 6	ON	ON	ON
Preset 7	OFF	OFF	ON

This table is only valid if all 3 preset speeds CF1, CF2 and CF3 are assigned to the programmable inputs.
In the factory default only preset speeds 1-3 are functional, because CF1 and CF2 are programmed.

Procedure (selected parameter F2):

1. Assign a preset speed to a programmable input with C0 - C4
2. Select the preset speed with the corresponding input interconnected to PV24
3. Adjust a frequency value with the arrow keys
4. Press the FUNC key to store the value (F2 is displayed)
5. Press the UP key to check if the adjusted frequency is displayed
6. Repeat the steps 1 - 4 for each other preset speed

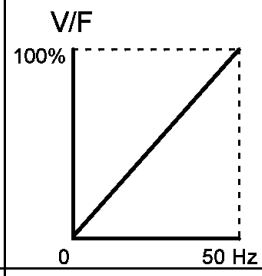
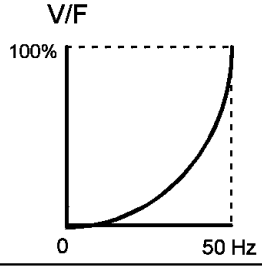
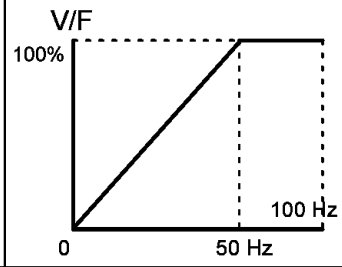
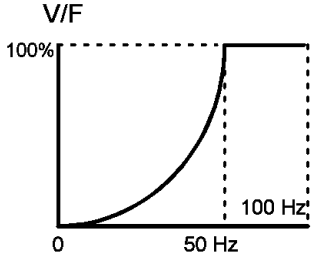
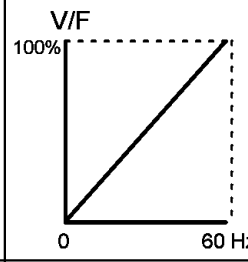
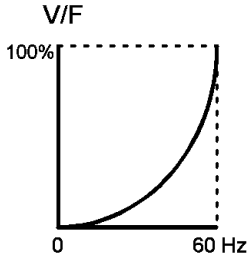
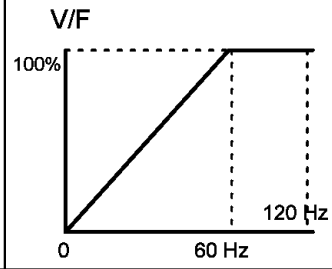
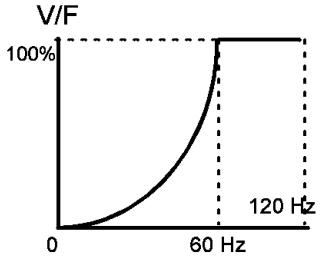
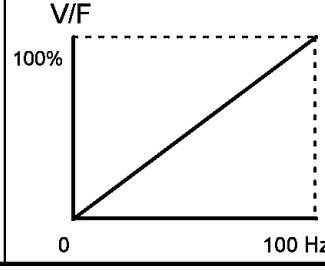
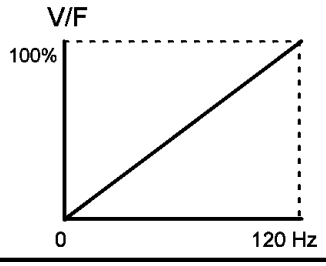
F4	Mot. direction pre-select	F (FWD) / r (REV)	FD: F

Pre-selects the motor direction with the arrow keys.
The adjustment during operation is possible!!

Setting	Parameter
F	FWD (Forward)
r	REV (Reverse)

F5	V/f characteristic selection	00 to 57	FD: 08 at 220 V FD: 00 at 400 V

Sets a V/f characteristic from a selection of 40.
If one of the parameters F11, A0, A62 and A63 in the 2nd level of operation is adjusted afterwards, it is possible to adjust another, different characteristic. In that case F5 will show "___".
The adjustment during operation is possible!! The last adjustment will always be dominant!!
After value 57 the display jumps back to 00 and starts again !!

Motornennspannung Nom. motor vltg.				Konstantes Lastmoment Constant torque	Motornennspannung Nom. motor vltg.				Variables Lastmoment Variable torque
200	220	230	240	PX 220 / ...	200	220	230	240	PX 220 / ...
380	400	440	460	PX 400 / ...	380	400	440	460	PX 400 / ...
00	**08**	16	24		04	12	20	28	
01	09	17	25		05	13	21	29	
02	10	18	26		06	14	22	30	
03	11	19	27		07	15	23	31	
50	51	52	53		54	55	56	57	

F6	1.acceleration time	0.1 to 999 s	FD: 10 at 220 V FD: 15 at 400 V

Changes the 1.accel. time with the arrow keys. Time in sec. equals to an accel. up to A63 (end frequency).
The adjustment during operation is possible!!

The value changes in 0.1 s steps in the range 0.1 to 99.9 s and in 1 s steps in the range 100 to 999 s.
If you change the value during operation, make sure that you press the FUNC key afterwards.

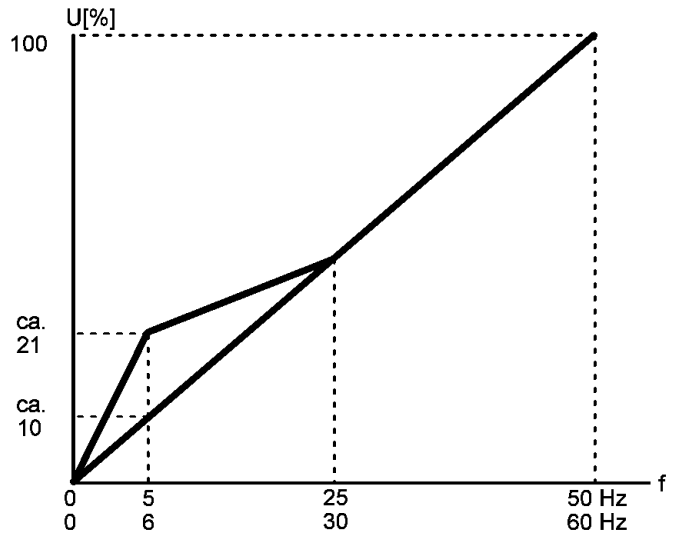
F7	1.deceleration time	0.1 to 999 s	FD: 10 at 220 V FD: 15 at 400 V

Changes the 1.decel. time with the arrow keys. Time in sec. equals to a decel. from A63 (end frequency).
The adjustment during operation is possible!!

The value changes in 0.1 s steps in the range 0.1 to 99.9 s and in 1 s steps in the range 100 to 999 s.
If you change the value during operation, make sure that you press the FUNC key afterwards.

F8	Voltage boost	0 to 99	FD: 11

With this parameter a not sufficient starting torque can be increased in the lower frequency range.
The adjustment during operation is possible!!



The adjustment only takes effect if V/f control mode is used. In case of Sensorless-Vector-Control (SVC1, SVC2) nothing will happen. In the case of adjustment in real time, press the FUNC key to store the value.

F9	Operating mode: Ref. value, Start, Stop, ...	00 to 03	FD: 03

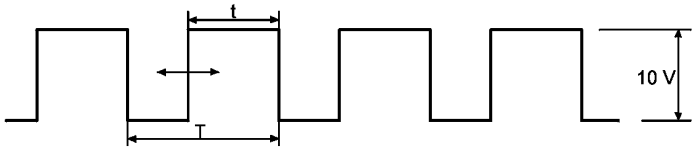
This parameter determines from where a start command and/or a reference value will be accepted.

Setting	Start command	Reference from
00	Keypad	Keypad
01	Keypad	Control terminals
02	Control terminals	Keypad
03	Control terminals	Control terminals

The adjustment during operation is not possible!!

F10	Analogue meter adjustm.	01 to 99	FD: 72

The voltage that is outputted to the FM terminal can be adjusted.
By changing the ratio t/T the connected measuring instrument can be adjusted so that it indicates full scale when the output is maximized.



Setting range:
for freq. = maximum frequency
for current = 200 % inverter I_{Nom}

The adjustment during operation is possible!!

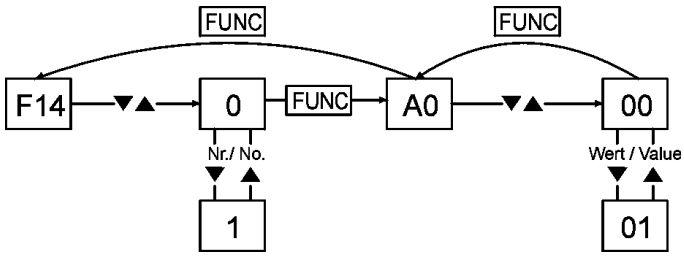
F11	Motor nominal voltage	220 V: 200, 220, 230, 240 400 V: 380, 400, 415, 440, 460, 480	FD: 220 V FD: 380 V

This parameter adjusts the output voltage of the inverter.
The adjustment during operation is not possible!!

F14	2nd level of operation	all parameters of the 2nd level	FD: 0

The 2nd level of operation contains parameters, where it is not necessary to adjust them or parameters that are not needed for standard applications. See table pages 6-7.
The adjustment during operation is possible!!

Sequence of selection:



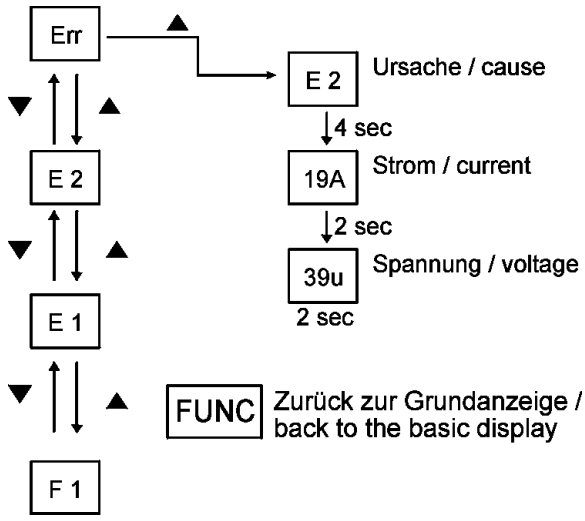
After changing a value make sure to store it by pressing the FUNC key. During operation it is not possible to adjust parameters. They can be only selected and displayed. F14 will always display the last adjusted parameter.

Err	Trip memory	the last 3 trips	FD: none

The trip memory stores the last 3 trips. The display is shown if an error occurs or if the parameter is selected with the FUNC key.

It is not possible to select „Err", if there was no trip since the power supply was switched on or since the trip memory was cleared.

For the latest trip the values of current and voltage at the time of tripping can be displayed.



Description of the 2nd level of operation:

A0	**Operating method**	**0 to 2**	**FD: 0**

Selection of a control method with the arrow keys. To store the value press the FUNC key.

Setting	Parameter
0	Standard - V/f characteristic
1	Sensorless-Vector-Control SVC1 for standard motors
2	Sensorless-Vector-Control SVC2 for special motors (adjust the motor data with BE-4!!)

Remark:
If a V/f characteristic is set by F5 after Sensorless-Vector-Control was selected with A0, the control method is automatically set back to V/f control.

A1	**Motor capacity setting**	**0.37 to 5.5**	**FD: see table**
A2	**Pole number**	**2, 4, 6, 8**	**FD: 4**

Sets the nominal motor power for the used machine (A1) or the number of motor poles (A2).

Invertertype	Fact. default for A1
PX 220/0,4C	0.37
PX 220/0,7C	0.75
PX 200/1,5C	1.5
PX 220/2,2C	2.2
PX 400/1,5C	1.5
PX 400/2,2C	2.2
PX 400/4,0C	4.0

Remarks:
- To achieve the best motor performance in sensorless-vector-control, make sure that you always adjust the fitting nominal power. Besides it is not possible to operate two or more motors.
- Adjust always the fitting motor power in V/f-mode too.

A3	**fMAX increase**	**0.0 to 15 Hz**	**FD: 0.0**

With this parameter it is possible to increase the end frequency (A63) in 0.1 Hz steps up to a value of 15 Hz. This will cause an increase of the output frequency up to 15 Hz without leaving the adjusted F5 curve.

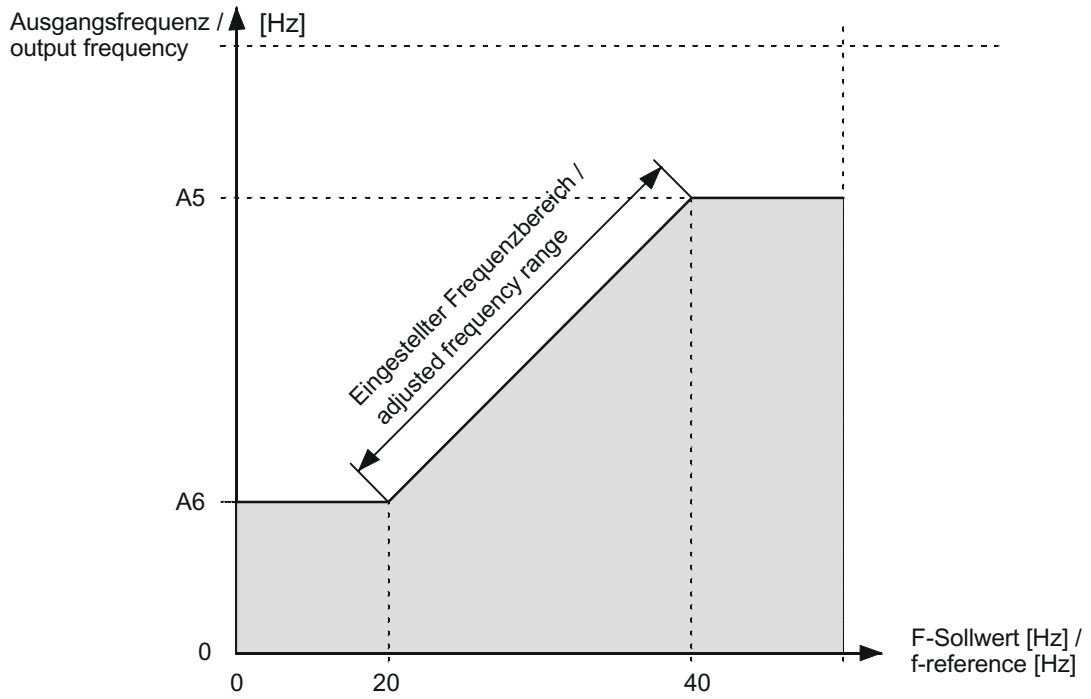
A4	**Starting frequency**	**0.5 to 5.0 Hz**	**FD: 0.5**

The frequency inverter always starts with minimum 0.5 Hz.
The value can be increased in 0.1 Hz steps up to 5 Hz.

Remarks:
- The acceleration and deceleration time will be decreased if the starting frequency is increased.
- A too high adjusted starting frequency may cause the inverter to trip with overcurrent.

A5 **A6**	**fMAX limitation** **fMIN limitation**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)** **0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0** **FD: 0.0**

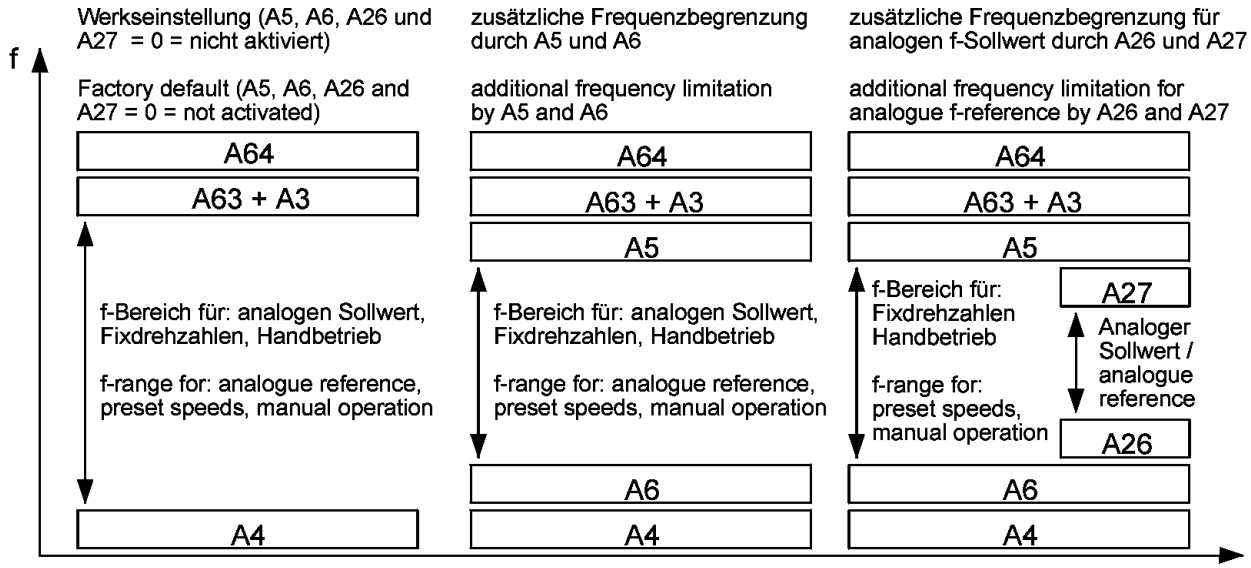
These two parameters create an operating range within the limits that were selected with A4, A63 or A63 + A3. The parameters A5 and A6 avoid the adjustment of the output frequency in inadmissible ranges. Factory default is „0" for both parameters, which means that they are inactive.



Remarks:

- A5 must be adjusted first.
- A reference value from the inputs O or OI, which is lower than A6 or higher than A5 will not cause the output frequency to leave the adjusted area.
- It is not possible to adjust A6 among 0.0 and A4.
- It is not possible to adjust A5 higher than A63 + A3.
- It is not possible to adjust A6 higher than A5.
- If A4 or A63 is changed after A5 or A6 were adjusted, A5 and A6 will show „____". Pressing one of the arrow keys will cause the parameters to jump to their maximum possible value.

The following drawing shows the coherences:



A7	**Skip frequency 1**	**0.0 to 375 Hz**	**FD: 0.0**
A8	**Skip frequency 2**	**0.0 to 375 Hz**	**FD: 0.0**
A9	**Skip frequency 3**	**0.0 to 375 Hz**	**FD: 0.0**

It is possible to adjust up to three lock out areas, where mechanical resonance's might occur. The areas will be controlled along the acceleration or deceleration ramp and not stationary. The adjustment is done in 0.1 Hz steps in the range 0.0 to 99.9 Hz, above in 1 Hz steps. The lock out hysteresis is adjusted with parameter A68.

A10	**Carrier frequency**	**5 / 8 / 12 / 16 kHz**	**FD: 16**

Adjustment of the switching frequency of the IPM module.

Remark:
A lower switching frequency will reduce the disturbances and earth currents caused by the motor cable but will increase the motor noise on the other hand.

A11	**Freq. command sampling**	**1 to 8**	**FD: 8**

This parameters filter undesirable disturbances of the analogue value or improves the sample rate.

Setting	1	**8**
Filter effect	low	high
Sample rate	fast	slow

A12	**Preset speed 1**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**
A13	**Preset speed 2**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**
A14	**Preset speed 3**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**
A15	**Preset speed 4**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**
A16	**Preset speed 5**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**
A17	**Preset speed 6**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**
A71	**Preset speed 7**	**0.0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**

Adjustment of up to 7 preset speeds (alternate to parameter F2). They can be selected individually by inter-connecting a programmed input (CF1 - CF3) with PV24. The adjustment is done in 0.1 Hz steps in the range 0.0 to 99.9 Hz, above in 0.1 Hz steps.

Preset speed	CF1	CF2	CF3
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	ON	OFF	ON
5	OFF	ON	ON
6	ON	ON	ON
7	OFF	OFF	ON

ON means: Interconnected with PV24

Remark:
- To use the preset speeds 4 to 7, one of the inputs 1 to 5 has to be programmed to CF3 first.
- Preset speeds will always superimpose the actual frequency reference, independent of F9.

A18	**2nd acceleration time**	**0.1 to 999 s**	**FD: 10.0**
A19	**2nd deceleration time**	**0.1 to 999 s**	**FD: 10.0**

Sets the 2nd acceleration time (A18) or the 2nd deceleration time (A19) in seconds. The adjustment is done in 0.1 s steps in the range 0.1 to 999 s in 0.1 s steps, above in 1 s steps.

To activate the 2nd set of ramps one of the inputs 1-5 has to be programmed to 2CH (setting. 07).

A20 **A21** **A22**	**DC brake: fSTART** **DC brake: Power** **DC brake: Time**	**0.5 to 375 Hz** **0 to 36 (400 V units: 0 to 20)** **0 to 600 s**	**FD: 0.5** **FD: 0.0** **FD: 0.0**

If the DC brake function is activated (see A55), the frequency inverter decelerates on the with A19 adjusted deceleration ramp and starts the DC braking at the with A20 adjusted frequency.
The adjustment is done in 0.1 Hz steps in the range 0.0 to 99.9 Hz, above in 1 Hz steps.

Remarks:
- ❍ During DC braking an overload switch-off might occur (E5).
- ❍ During DC braking the switching frequency is always 5 kHz, independent of the setting of A10.

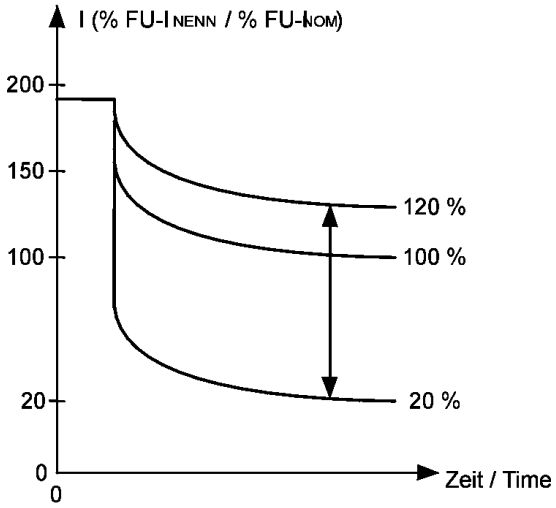
A21 sets the power for the DC brake at 0 Hz (A55) or for the DC brake function (DB). 0 means "very low" and 36 "very high".

A22 sets the time for both, DC braking at 0 Hz (A55) and for the DC braking function (DB). See mounting & connecting instruction, page 38. The adjustment is done in 0.1 s steps in the range 0 to 99.9 s, above in 1 s steps.

A23	**Electronic motor protection**	**20 to 120 %**	**FD: 100**

Sets the thermal motor protection ("maximum continuous current") in percentage of the inverters nominal current.

A23 = INOM,Mot / INOM,Inverter

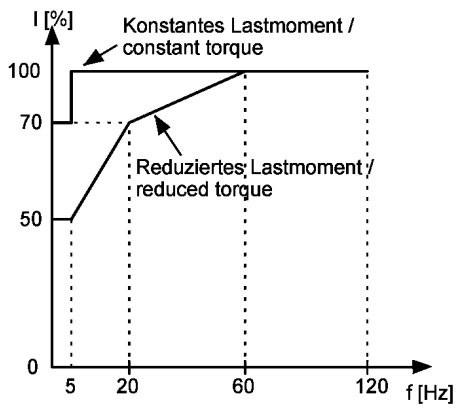


Remarks:
- ❍ If the value is higher than the motor nominal current, the motor cannot be protected by the thermal sensor. In that case a thermistor or something similar has to be used.
- ❍ For a value of 100 % or higher, a continuous operation of the inverter is only permitted with a lower switching frequency.

A24	**Motor protection characteristic**	**0 / 1**	**FD: 1**

Adjusts the characteristic of the thermal motor protection.

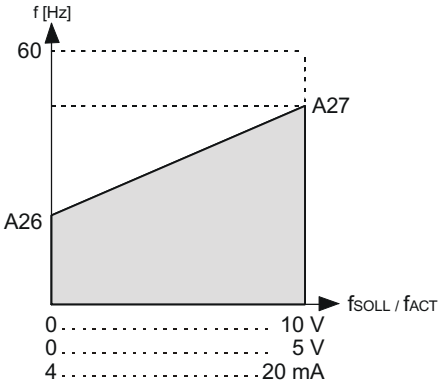
Setting	Characteristic
0	reduced load torque (natural cooled)
1	constant load torque (forced cooled)



A26 **A27**	**Ext. fREF: start value** **Ext. fREF: end value**	**0 to A63 (+ A3) Hz (max. 375 Hz)** **0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0** **FD: 0.0**

Sets the range within the frequency inverter accepts an external reference, i.e.

A26 = 30 Hz, A27 = 50 Hz means:
0 - (5)10 V corresp. to 30 to 50 Hz
4 - 20 mA corresp. to 30 to 50 Hz



The adjustment is done in 0.1 Hz steps in the range 0.0 to 99.9 Hz, above in 1 Hz steps.
Both value set to „0" will cause the function to be inactive.

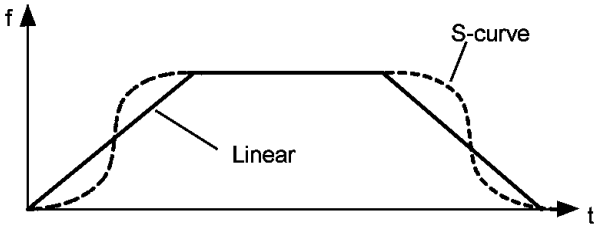
Remarks:

- If the maximum frequency is lower than A26, it will show „___"; by pressing one of the arrow keys it will jump to its maximum possible value.
- By exchanging the values for A26 and A27, mean A26 = end value and A27 = start value, the reference value can be reversed.

A28 **A29**	**ACCEL: Linear or S ramp** **DECEL: Linear or S ramp**	**0 / 1** **0 / 1**	**FD: 0** **FD: 0**

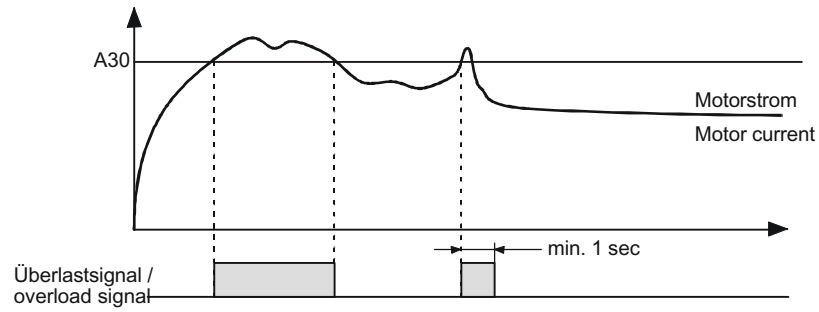
Both parameters determine if the acceleration ramp (A28) and/or the deceleration ramp (A29) is linear or follows an S ramp.

Setting	Parameter
0	Linear
1	S ramp



A30	**Overcurrent signal: Adjustment**	**50 to 150 %**	**FD: 150**

Sets the value (in percentage of the motor nominal current) at which the overload message caused by too high current responds.

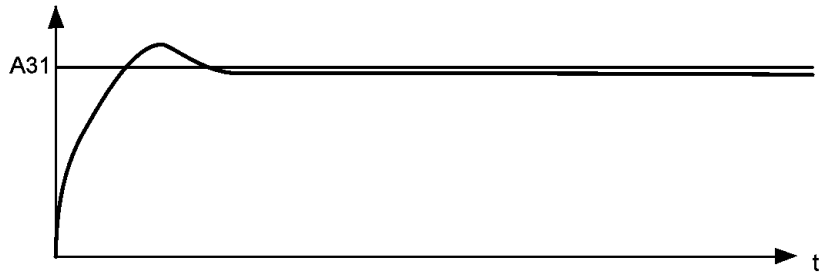


Remarks:

- The message is displayed for at least 1 sec.
- Use the parameter C10 to assign the overload message to the programmable output (te. 11).

A31	Current limitation: Adjustment	50 to 150 %	FD: 150

Sets the value at which the inverter reduces the output frequency and suppresses the output current.
See also parameter A85.



A32	Current limit.: Content	0 / 1	FD: 0

This parameter determines when the current limitation is active.

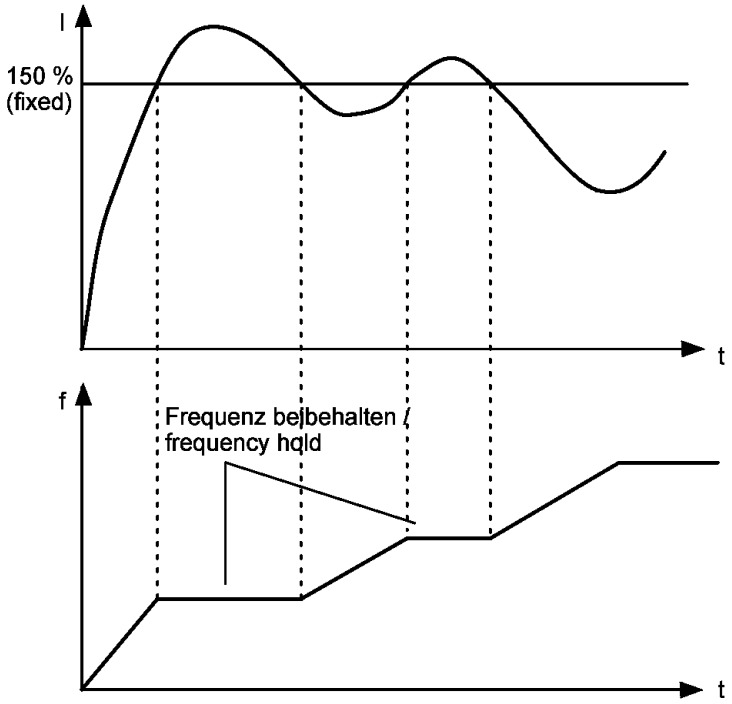
Setting	Current limitation active
0	during acceleration and at constant speed
1	only at constant speed

Remark:
The current limitation is not functional during deceleration.

A33	LAD function: ON / OFF	0 / 1	FD: 0

Equals to a current limitation during acceleration and deceleration.
If an overcurrent occurs, the acceleration or deceleration is stopped until the respond value is decreasing. This function is independent of the parameters A30, A31 and A32.

Setting	LAD function
0	active (ON)
1	inactive (OFF)



A34	Restart selection	0 / 1	FD: 0

Influences the reaction of the frequency inverter if a trip occurs.

Setting	Reaction
0	trip display and signal
1	restart at 0 Hz

Remark:
The inverter tries a restart 3 times in 10 minutes for I>> and U>>, in case of U<< or loss of phase the inverter tries 16 times to restart the equipment.

A35	U<< detection: Y/N	0 / 1	FD: 0

Determines if the inverter stores an undervoltage after a switch off or a trip.

Setting	Reaction
0	ignore undervoltage
1	undervoltage causes a trip

Remark:
This parameter only works correct if A34 = 0 and the DC link voltage is out of range.

A36	AVR at deceleration: Y/N	0 / 1	FD: 0

This parameter switches the "automatic voltage regulation" of the decelerating motor on or off.

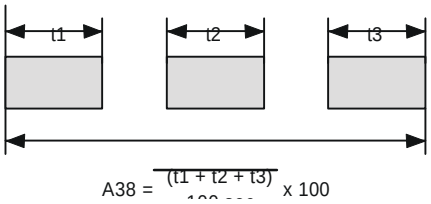
Setting	Parameter
0	AVR is equal to the voltage value of F5
1	AVR corresponds to A37

A37	U_{MOTOR} at DECEL	220 V units: 200 - 270, 000 400 V units: 380 - 540, 000	FD: 220 FD: 380

This parameter adjusts the motor voltage of the decelerating motor.
Remarks:
- The value of A37 is independent of the value of F5.
- Adjustment 000 switches off the AVR function!
- Too high values might cause an overcurrent trip!
- A37 can only be adjusted if A36 is set to „1“ !!

A38	Braking unit: Switch-on time	0.1 to 30 %, 31.0 %	FD: 5.0 %

Sets the maximum possible switch-on time of the braking unit (in percentage) relating to a duty time of 100 s.
If the braking unit is working longer than this time, the inverter will trip with E6.



Remarks:
- Adjustment 31 % will switch off this function.
- If an external resistor is used, its value must not be lower than stated in the table below.
- The connection lines between resistor and frequency inverter should not exceed a maximum length of 5m.

Type	PX 220/0,4C	PX 220/0,7C	PX 220/1,5C	PX 220/2,2C	PX 400/1,5C	PX 400/2,2C	PX 400/4,0C
W (minimum)	100	35	35	35	180	100	100

A39	**Freq. arrival signal: ON-level**	**0 to 100 %**	**FD: 100**
A40	**Freq. arrival signal: OFF-level**	**0 to 100 %**	**FD: 100**

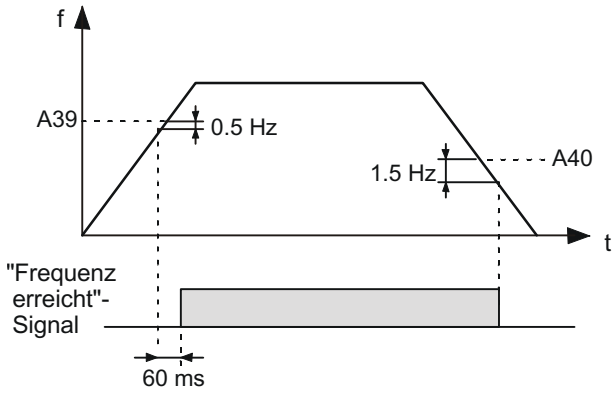
A39 sets the ON level (in percentage of A63) for the "f>fLIMIT" signal. The adjustment is done in 1 % steps.

A40 sets the OFF level (in percentage of A63) for the "f>fLIMIT" signal. The adjustment is done in 1 % steps.

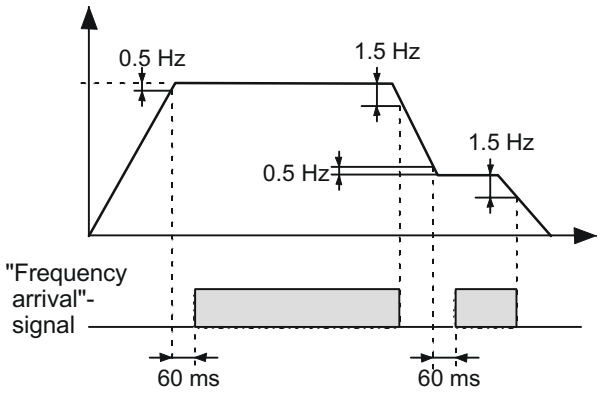
Parameter A49 sets the frequency arrival characteristic.

Remarks:
- A39 and A40 set the fLIMIT for A49 = 1.
- An adjustment of A40 > A39 ignores A40 and uses A39 as the ON/OFF level without hysteresis.

Einstellung: A49 = 1; Signal bei f ≥ f_{LIMIT} (entspr. A39/A40) /
Adjustment: A49 = 1; signal at f ≥ f_{LIMIT} (corresp. to A39/A40)



Einstellung: A49 = 2; Signal bei f = f_{SOLL} = F2 /
Adjustment: A49 = 2; signal at f = f_{SOLL} = F2



A41	**FWD lock: ON / OFF**	**0 / 1**	**FD: 1**
A42	**REV lock: ON / OFF**	**0 / 1**	**FD: 1**

Releases the corresponding motor direction or locks it.

Setting	Parameter
0	locked
1	unlocked

A43	**STOP key: ON / OFF**	**0 / 1**	**FD: 0**

Locks or unlocks the STOP key on the keypad.

Setting	Parameter
0	unlocked
1	locked

Remarks:
- In the factory default the STOP key is always active, even in the terminal mode.
- This parameter is inactive if "Start command from keypad" is selected (i.e. F9 = 00).

A48	**Analogue input: 0-5 V / 0-10 V**	**0 / 1**	**FD: 0**

Determines if 5 V or 10 V are assigned to the terminals O and L. This function adjusts the kind of reference value.

Setting	Parameter
0	5 V
1	10 V

Remark:
Voltage and current reference value are added, that means there is no change over. Make sure that only one reference value is assigned.

A49	Frequency arrival signal: Characteristic	1 / 2	FD: 2

The kind when the frequency arrival signal is active is selected.

Setting	Parameter
1	f ³ fLIMIT
2	f = fREF (and constant speed)

Remark:
Only for adjustment 1 the limits adjusted with A39 and A40 are valid.

A50	Analogue/Digital signal	0 / 1	FD: 1

This parameter changes the FM terminal in that way, if a digital or analogue output signal is outputted. (see also mounting, connecting & projecting instruction, terminal FM)

Setting	Parameter
0	digital
1	analogue

A51	Analogue output: f / I	0 / 1	FD: 0

This parameter changes the FM terminal in that way, if frequency or current is outputted.

Setting	Parameter
0	Frequency
1	Current

A52	RUN message selection	1 / 2	FD: 1

Determines when the RUN message is outputted.

Setting	Parameter
1	during running
2	during running and DC braking

Remark:
This signal has to be assigned to the programmable output 11 using the parameter C10.

A53	fREF changeable at softlock	0 / 1	FD: 0

Determines if the reference value can be changed if the softlock function is active.

Setting	Parameter
0	fREF change possible
1	fREF change impossible

A55	DC braking: ON / OFF	0 / 1	FD: 0

This parameter locks or unlocks the DC braking function.

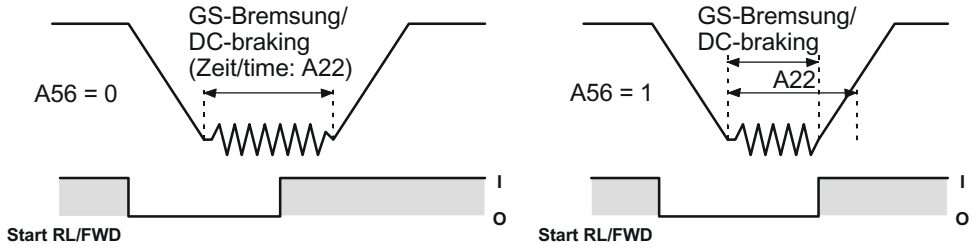
Setting	Parameter
0	DC braking locked
1	Dc braking unlocked

A56	DC braking selection	0 / 1	FD: 1

Determines if the adjusted DC braking time (corresponding to A22) is stopped when a new start command is released or not.

Setting	Parameter
0	time is running (edge)
1	time is stopped (level)

Remark:
This parameter is relevant for the DB function when assigned to a programmable input. See mounting & connecting instruction, page 38.



A57	Clear trip memory: Y/N	0 / 1	FD: 0

With this parameter the trip memory can be cleared by the user.

Setting	Parameter
0	inactive
1	clear trip memory

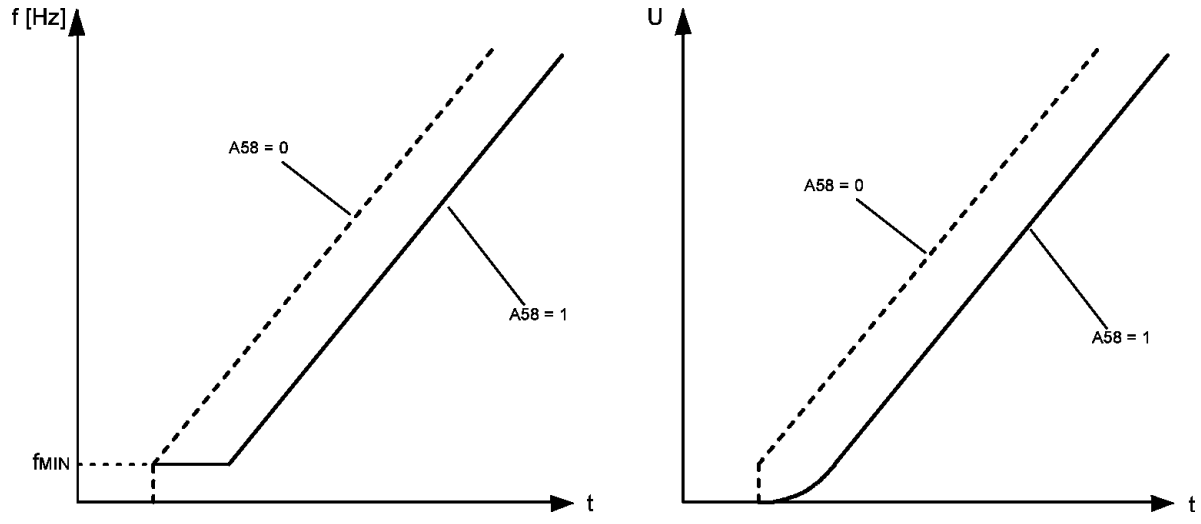
Remark:
After the parameter is set to 1 the power supply must be switched off or a reset must be released to take effect.

A58	Start with reduced voltage	0 / 1	FD: 1

During acceleration (until fMIN is arrived) a kind of soft start is done.

Setting	Parameter
0	No reduced voltage
1	Start with reduced voltage

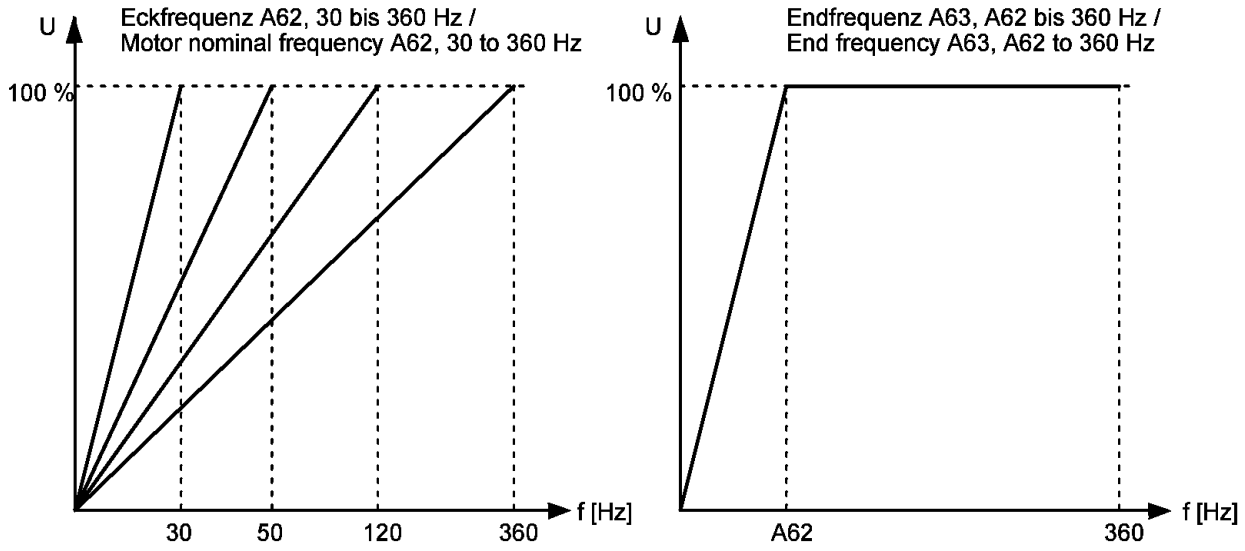
Remark
Setting "0" makes the start response quicker, but overcurrent may occur. Set "1" for "heavy loads"-starting torque.



A62	**Base frequency**	**50 to A63 Hz**	**FD: 50**
A63	**End frequency**	**50 to 120 (360) Hz**	**FD: 50**

Parameter A62 adjusts the value of output frequency, where the output voltage has its maximum.
Normally the nominal frequency of the motor is adjusted. The corresponding data can be read on the motor name plate.

If you wish to adjust an area with constant maximum voltage beyond the point of maximum voltage frequency (A62), this has to be done with parameter A63.



A64	**Maximum frequency**	**0 / 1**	**FD: 0**

Sets the upper limit frequency.

Setting	Maximum frequency
0	120 Hz
1	360 Hz

A68	**Skip frequency range**	**0.0 to 9.9 Hz**	**FD: 0.5**

Sets the range for the with A7 - A9 adjusted lock out frequencies (±).
A value of ±2 Hz has the meaning of a 4 Hz lock out range.

A71	**Preset speed 7**	**0 to A63 (+ A3) Hz (max. 375 Hz)**	**FD: 0.0**

See page 15.

A80	**fREF: Voltage calibration**	**0 to 255**	**Pre-adjusted!!**
A81	**fREF: Current calibration**	**0 to 255**	**Pre-adjusted!!**

This parameter should not be changed during normal operation too often!!

The parameter controls the relationship between the external frequency reference value and the actual inverter output frequency and is pre-adjusted from the factory. The values must only be adjusted in case of serious differences and by properly qualified staff.

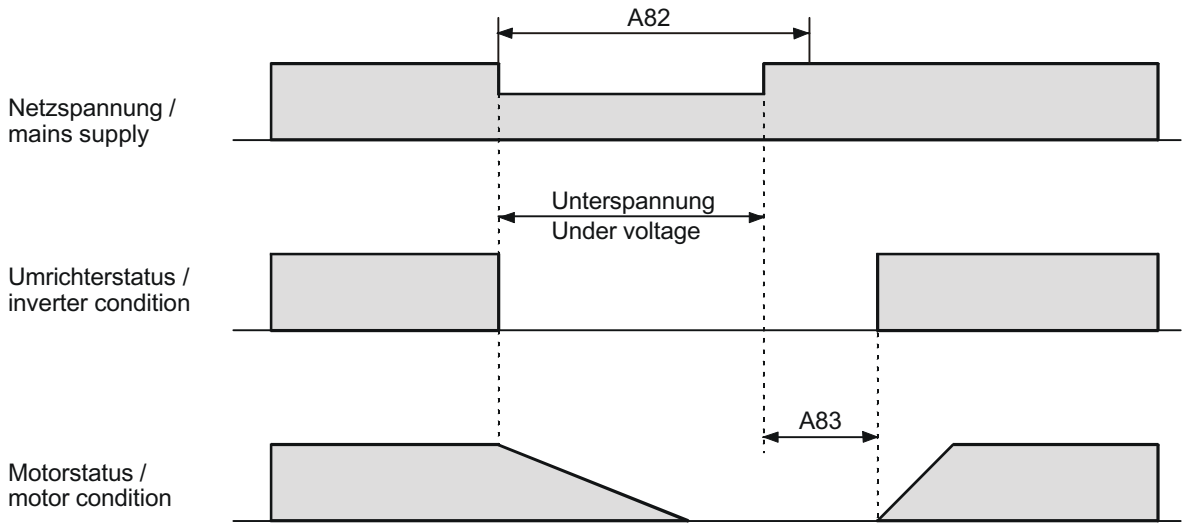
Remarks:

- Is the output frequency lower than the reference value, the parameter has to be increased.
- Is the output frequency higher than the reference value, the parameter has to be decreased.

A82 **A83**	**Allowed U<< time** **Waiting time for restart**	**0.3 to 3.0 s** **0.3 to 100 s**	**FD: 1.0** **FD: 10.0**

If an undervoltage trip occurs during operation (i.e. power supply failure), the inverter will inhibit the pulses. If the voltage comes back within the adjusted time (A82), the inverter can be started again. If not, the equipment will trip with an undervoltage signal.

A83 sets a time delay for which the inverter waits until it tries to restart. Of course this is only possible if the voltage comes back within the adjusted A82 time.



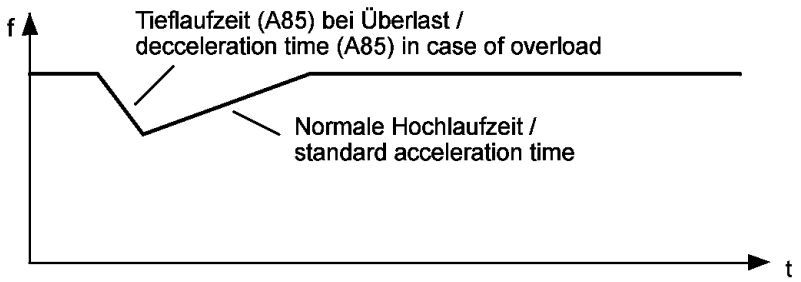
A84	**Softlock ON/OFF**	**0 / 1**	**FD: 0**

Locks or unlocks the parameter setting.

Setting	Parameter
0	unlocked (parameters adjustable)
1	locked (parameters not adjustable)

A85	**Deceleration time for current limitation**	**0.3 to 31.0 s**	**FD: 1.0**

If a current limitation occurs, this parameter sets an independent deceleration time to reduce the frequency. Both functions A31 and A85 should be used together in accordance to the motor and the load.



C0 - C4	Setting of the programmable inputs 1 - 5	0 to 12	FD: see table

The inputs' terminals 1 - 5 can be programmed in accordance to the following table:

Parameter	Terminal	Factory default
C0	1	**01** (= CF1, preset speed 1)
C1	2	**02** (= CF2, preset speed 2)
C2	3	**07** (= 2CH, 2nd set of ramps)
C3	4	**11** (= RS, reset)
C4	5	**00** (= REV, reverse run)

The following adjustments are possible:

Setting	Short name	Description	Factory default for
0	REV	Reverse run	C4
1	CF1	Preset speed 1	C0
2	CF2	Preset speed 2	C1
3	CF3	Preset speed 3	
4	DB	External DC braking	
5	STN	Factory default setting	
6	SET	2nd set of parameters	
7	2CH	2nd set of ramps	C2
8	FRS	Pulse inhibit	
9	EXT	External trip	
10	USP	Restart protection at U<<	
11	RS	Reset	C3
12	SFT	Softlock	

Remarks:

- It is not possible to select the same value for two parameters (C0 - C4).
- If you wish to set a function to another terminal, first select the new function for the „source"-terminal and then select the old function for the „destination"-terminal.
- Adjustment 11 (RS=Reset): Continuous reset signal is not possible. An inverter which operates without any failure will decelerate to 0 Hz, if a reset-signal is released ! Pay attention to this, if the unit is used in plants where all units are resetted by a single signal.

C10	Setting of the programmable output 11	00 to 02	FD: 00

The output 11 can be programmed as follows:

Setting	Parameter	
00	"Frequency arrival" signal	see also parameter A39, A40 and A49
01	RUN signal	see also parameter A52
02	Overcurrent message	see also parameter A30

C20	Inputs 1-5: Inversion	00 to 1F	FD: 00

This parameter changes the condition of the programmable inputs 1 - 5.

Value	0F	0E	0d	0C	0b	0A	09	08	07	06	05	04	03	02	01	**00**
Te. 1	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	**C**
Te. 2	O	O	C	C	O	O	C	C	O	O	C	C	O	O	C	**C**
Te. 3	O	O	O	O	C	C	C	C	O	O	O	O	C	C	C	**C**
Te. 4	O	O	O	O	O	O	O	O	C	C	C	C	C	C	C	**C**
Te. 5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	**C**

Value	1F	1E	1d	1C	1b	1A	19	18	17	16	15	14	13	12	11	10
Te. 1	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C
Te. 2	O	O	C	C	O	O	C	C	O	O	C	C	O	O	C	C
Te. 3	O	O	O	O	C	C	C	C	O	O	O	O	C	C	C	C
Te. 4	O	O	O	O	O	O	O	O	C	C	C	C	C	C	C	C
Te. 5	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

C = normal, that means: control function is carried out by a 1-signal
(voltage on the input, current through optocoupler)
i.e. selection of the 2nd set of ramps, if the external contact is closed.

O = inverted, that means: control function is carried out by a 0-signal (no current through optocoupler)
i.e. pulse inhibit of the inverter, if the external contact is opened.

Remark:
A terminal which was programmed to RS (reset) can only have a „C"-state.
Even in case of selecting "O"-state, the terminal will be switched back to „C"-state.

C21	Output 11 and relay: Inversion	00 to 03	FD: 03

This parameter changes the condition of the programmable output 11 and of the relay AL 0 / 1 / 2.

Value	**03**	02	01	00
Te. 11	**i**	n	i	n
Te. AL 0/1/2	**n**	n	i	i

n = normal, that means: the open-collector output 11 is switched through or the relay is energized, if the condition occurs.
i.e. output 11 is closed if fact = fref or relay energises at "Ready"

i = inverted, that means: the open-collector output 11 opens or the relay is de-energized, if the condition occurs.
i.e. output 11 is closed and opens only if fact = fref or the relay energises at "Trip".

Projecting, Mounting, & Connecting

ELVO*vert* PX

0,4 to 2,2 kW, 1 AC 220 to 240 V
1,5 to 4,0 kW, 3 AC 380 to 460 V

This documentation covers information on mounting, connecting and projecting.
Details on operation and service can be read on page 3ff.

Regulations for the observance of the CE-directive and the new Power-Drive-Standard (EN 61800-3) are described in the instruction manual „Additional installation regulations PX, SX“ (Cat.no. 8074578).

In case of damage or incomplete delivery, please inform the supplier or the insurance company.
The manufacturer declines responsibility for faults occurring during transport or unpacking.

Mounting

General

Pay attention, that the mains voltage is within 1 AC 220 V - 240 V or 3 AC 380 V - 460 V, +/- 10 %, 50/60 Hz +/-5 %. Ambient conditions like high temperatures, high humidity, dust, dirt and aggressive gases should be avoided. The mounting place should be well ventilated and not be exposed to direct sunlight. Be sure that the unit is mounted on a perpendicular wall which is not subjected to vibrations. Also the wall should be made of non-flammable material.

Attention! Do not connect mains potential to the motor terminals U, V, W.

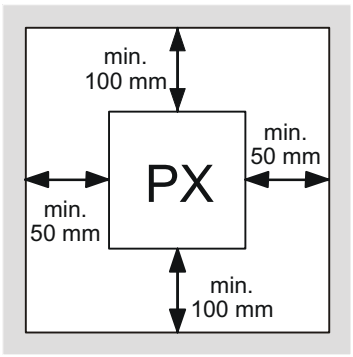
When operating a general-purpose motor at a high frequency exceeding 60 Hz, be sure to verify with the manufacturers the maximum rpm of the motor and machine.

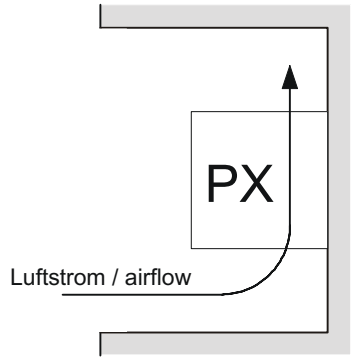
Withstand voltage tests and insulation resistance tests (megger tests) are executed for all frequency inverters before despatch. When conducting megger tests as a part of daily inspection, be sure that these tests are only executed between the main circuit and the ground. Do not execute megger tests on the control terminals.

Starting and stopping the inverter equipment should always be done via the control terminals and not by switching off main circuit breakers on the primary or secondary sides of the inverter. Do not insert leading power factor capacitors or surge absorbers between the motor terminals U, V, W and the motor.

Distances to other units or against the wall

For cooling purposes, be sure that the frequency inverters ELVOvert PX are mounted vertically. In addition, be sure that it is separated from other components and walls. Pay attention that no foreign matter can enter the equipment to avoid damage to the frequency inverter.





During wiring or other work on the equipment, do not allow any wire scraps, welding fragments, iron scraps, dust, etc. to enter into the inverter, therefore be sure to cover the top of the unit before working.

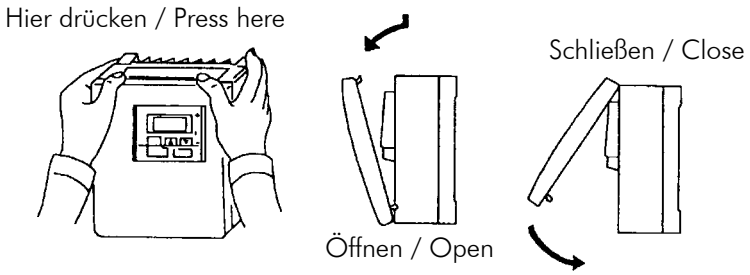
Pay attention that the allowed temperature range (-10°C to +40°C, +50°C without cover) is not fallen short off or exceeded. A high ambient temperature may cause a shorter lifetime of the frequency inverter.

Avoid to install heat generating units near the inverter.

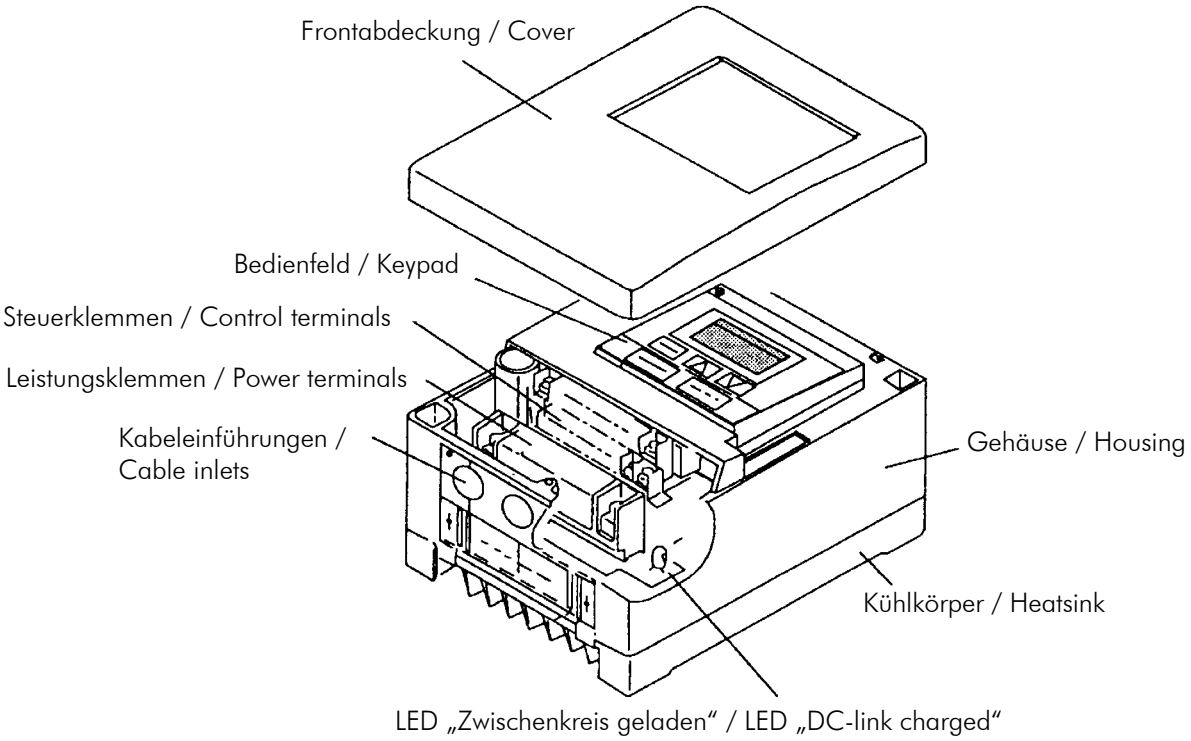
Also, when mounting the inverter in a cubicle, be sure to carefully consider ventilation and the dimensions.

Mechanical built-up

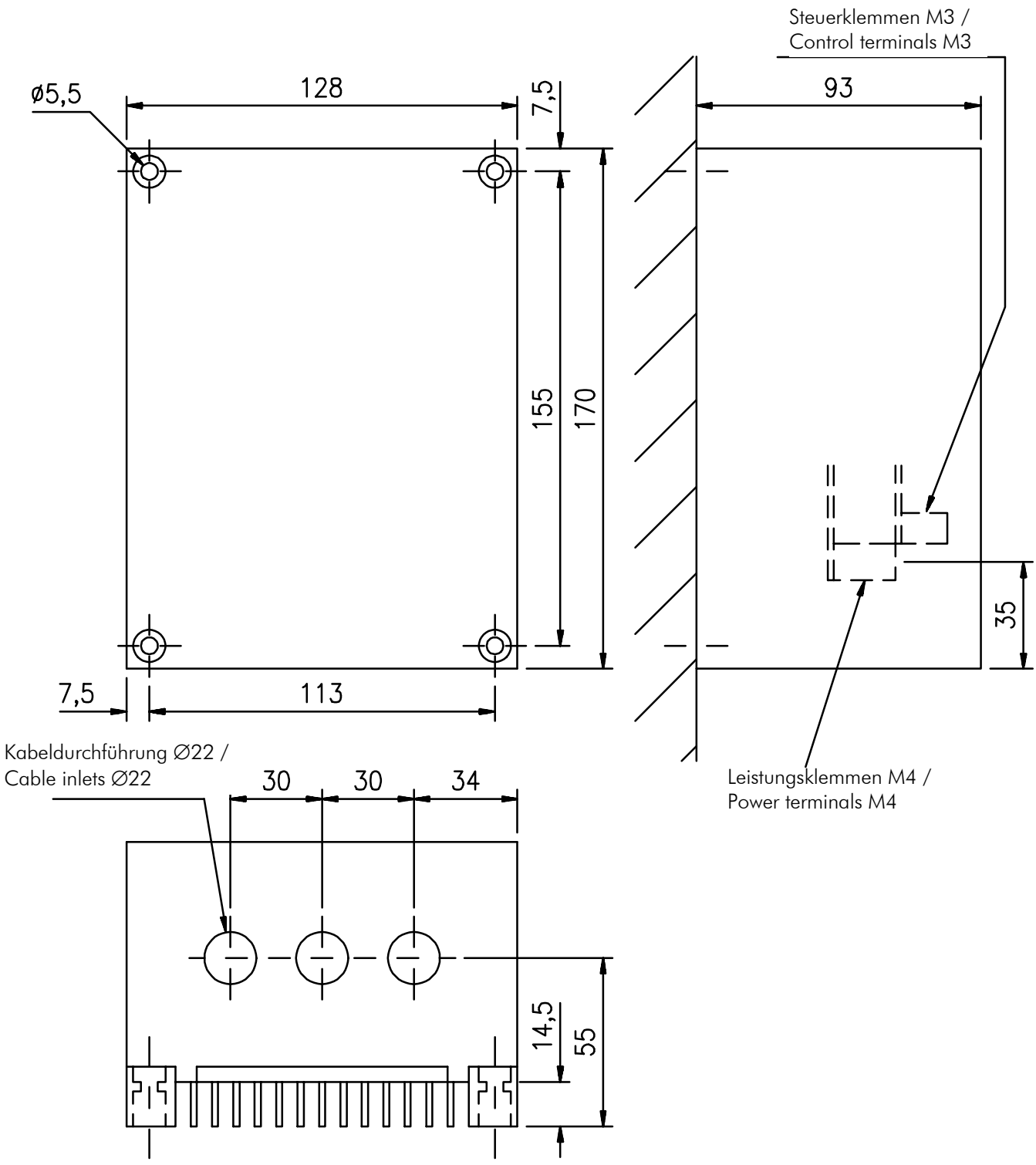
Opening and closing the front cover



Description of components



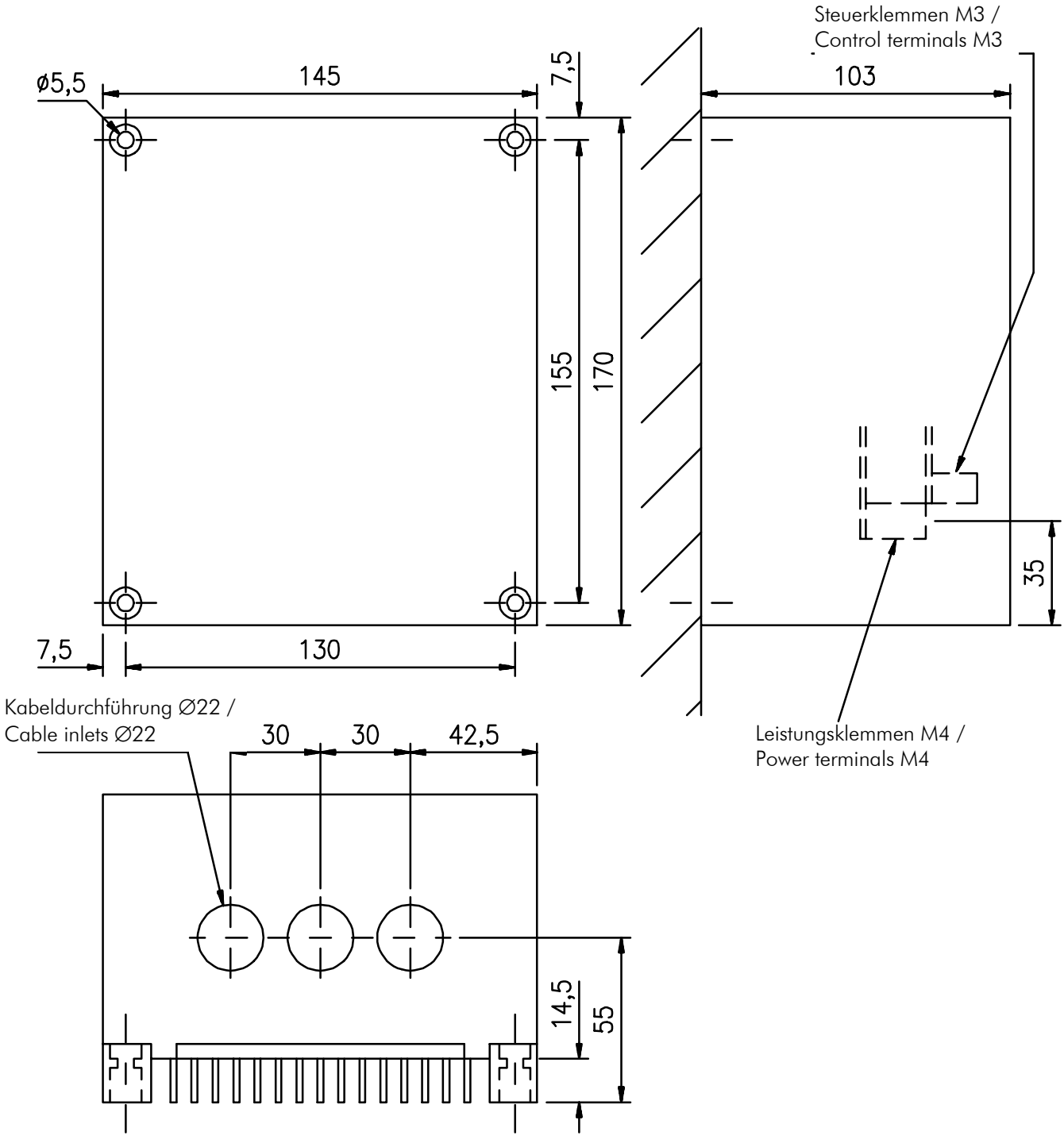
Dimensions ELVOvert PX 220/0,4C



Losses:	at 16 kHz switching frequency and 100 % load	40 W
	at 5 kHz switching frequency and 100 % load	34 W
	at 16 kHz switching frequency and 50 % load	25 W

Weight: app. 1,3 kg

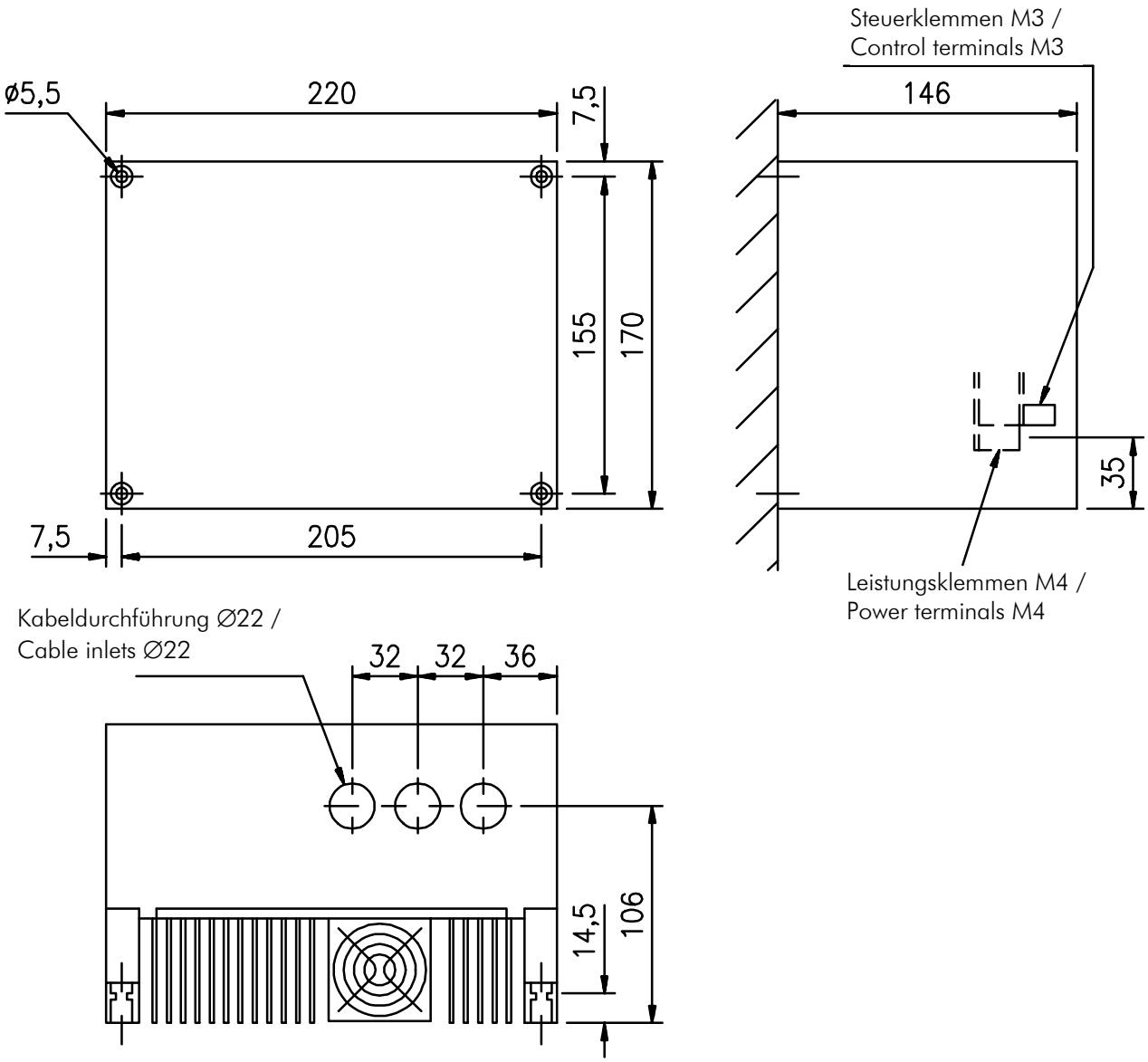
Dimensions ELVOvert PX 220/0,7C



Losses:	at 16 kHz switching frequency and 100 % load	65 W
	at 5 kHz switching frequency and 100 % load	55 W
	at 16 kHz switching frequency and 50 % load	40 W

Weight: app. 1,5 kg

Dimensions
ELVOvert PX 220/1,5C and 2,2C
ELVOvert PX 400/1,5C to 4,0C



Losses:	**PX 220/1,5C**	**PX 220/2,2C**	**PX 400/1,5C**	**PX 400/2,2C**	**PX 400/4,0C**
16 kHz, 100 %	75 W	110 W	100 W	135 W	208 W
5 kHz, 100 %	64 W	94 W	85 W	115 W	177 W
16 kHz, 50 %	45 W	65 W	60 W	81 W	125 W
Weight, app.:	3,0 kg	3,2 kg	3,0 kg	3,2 kg	3,2 kg

Power connections

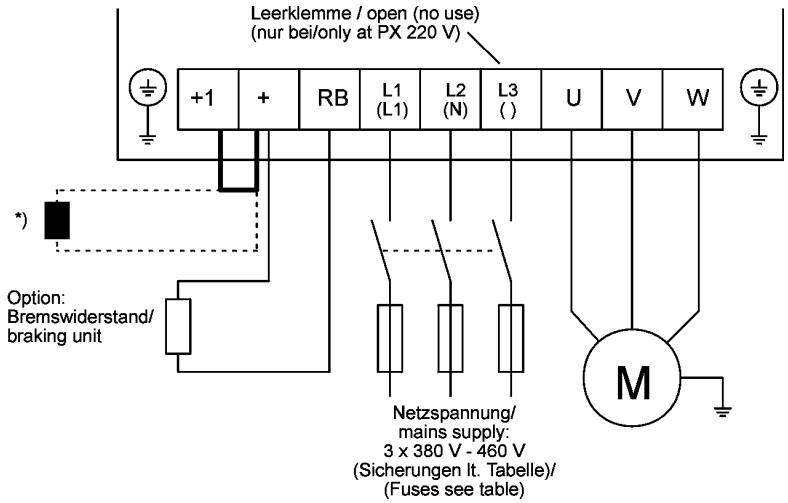
For connecting power and control terminals the front cover has to be removed. Be sure that no mains potential is connected to the motor terminals U, V, W, because this may damage the unit.

In case of more than one motor on a single inverter, each motor has to be protected.

Power connections ELVOvert PX 220/0,4C - 2,2C ELVOvert PX 400/1,5C - 4,0C

***) The terminals (+1) and (+) are linked (factory default !!). They can be used for connecting a single-phase DC-link reactor (remove the link !!) instead of a three-phase mains reactor.**

The mains terminal L3 at 220 V units is designed as an open terminal without any function !!



Terminal	Function	Description
L1, N or L1, L2, L3	Mains connection	PX 220/...: 1 AC 220-240 V ±10 %, 50/60 Hz ±5 % PX 400/...: 3 AC 380-460 V ±10 %, 50/60 Hz ±5 %
U, V, W	Motor connection	PX 220/...: 3 AC 220-240 V PX 400/...: 3 AC 380-460 V
+, RB	Braking resistor (optional)	Allowed resistor values: 100 W for PX 220/0,4C - PX 400/2,2C and 4,0C 35 W for PX 220/0,7C - 2,2C 180 W for PX 400/1,5C
+1, +	Connection for DC-reactor	Linked (factory default !!) Used for connecting a single-phase DC-link reactor instead of a three-phase mains reactor.
⏚	Eath connection (PE)	Min. 10 mm^2 or two electrical parallel wires via seperated terminals

Remarks for using earth leakage circuit breakers in the mains supply:

Frequency inverters with CE-filters (RFI-filter) and screened motor cables have a higher leakage current against earth. Especially in the moment of switching on this can cause unintentional triggerings of earth leakage circuit breakers. Because of the rectifier on the input side of the inverter there is the possibility to stall the switch-off function through amounts of DC-current. The following should be observed:

- Only short time-invariant and puls current-sensitive earth leakage circuit breakers with higher trigger current should be used.
- Other components should be secured with seperate earth leakage circuit breakers.
- Earth leakage circuit breakers in front of an inverter are not an absolut protection against direct touching.
- The ELVOvert PX units have no current-limiting function (in case of fault currents). Therefore they don´t violate the earthing.

Remarks:

1.) The motor cables should be separated from other lines and/or an option for reduction of the slew rate (du/dt) - has to be installed (Option AMF (MDR)).
Pay attention to have a correct potential balance.

2.) Be sure that the specified grounding is carried out.
Avoid using common grounding poles for several inverters.

3.) In case of the following operation conditions a mains reactor (UK app. 3 %) must be connected on the input side of the inverter. If not this may damage the equipment:
The unbalance factor of the power supply is 3 % or higher.
The mains capacity is at least 10 times greater than the inverter capacity or is 500 kVA or higher.
Abrupt power supply changes are expected.
The frequency inverter is used on a generator.
The frequency inverter is used in domestic premises (first enviroment).

Examples:
Several inverters are interconnected via a short bus.
An installed phase advance capacitor opens and closes.

4.) Attention ! The earth leakage safety is only for the protection of the frequency inverter and no protection for human life.

5.) For mains fuses and cable diameters the following values are valid:

Type	Mains fuses without NDR	Power lines 4-pole	Power lines Single wire	Control cables
PX 220/0,4C	10 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 220/0,7C	13 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 220/1,5C	20 A sluggish	2,5 mm^2	2,5 mm^2	0,75 mm^2
PX 220/2,2C	25 A sluggish	4,0 mm^2	2,5 mm^2	0,75 mm^2
PX 400/1,5C	13 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 400/2,2C	16 A sluggish	2,5 mm^2	1,5 mm^2	0,75 mm^2
PX 400/4,0C	20 A sluggish	2,5 mm^2	2,5 mm^2	0,75 mm^2

Type	Mains fuses with NDR	Power lines 4-pole	Power lines Single wire	Control cables
PX 220/0,4C	10 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 220/0,7C	10 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 220/1,5C	13 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 220/2,2C	20 A sluggish	2,5 mm^2	2,5 mm^2	0,75 mm^2
PX 400/1,5C	10 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 400/2,2C	13 A sluggish	1,5 mm^2	1,5 mm^2	0,75 mm^2
PX 400/4,0C	16 A sluggish	2,5 mm^2	1,5 mm^2	0,75 mm^2

We recommend the use of sluggish line protection fuses or line protection switches with „C"-characteristic.

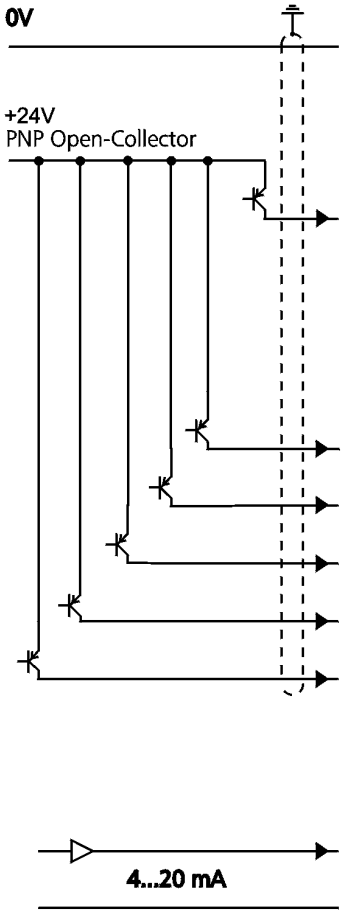
Regulations for the observance of the CE-directive and the new Power-Drive-Standard (EN 61800-3) are described in the instruction manual „Additional installation regulations PX, SX" (Cat.no. 8074578).

Control connections

Be sure to separate the control cables from the power supply and motor cables. Also the length should not exceed 20 m and must be shielded. If a crossing of control and power cables can not be avoided, be sure that they cross at a right angle.

Externe Verdrahtung

External wiring

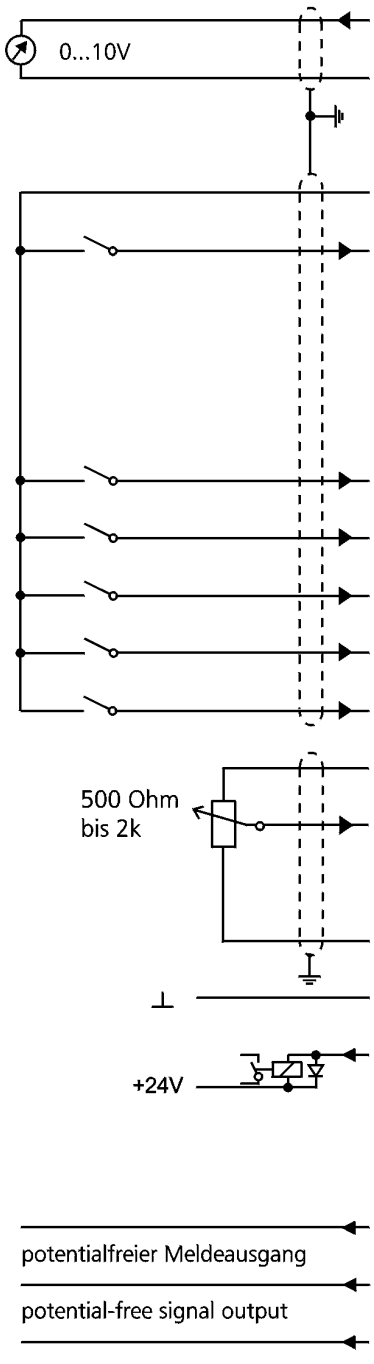


*) SMT-Steuerspannungs-sicherung PV24, 125 V, 200 mA, auf der Rückseite der Steuerklemmen-Platine

SMT-fuse for control voltage PV24, 125 V, 200 mA, on the backside of the control terminal PCB

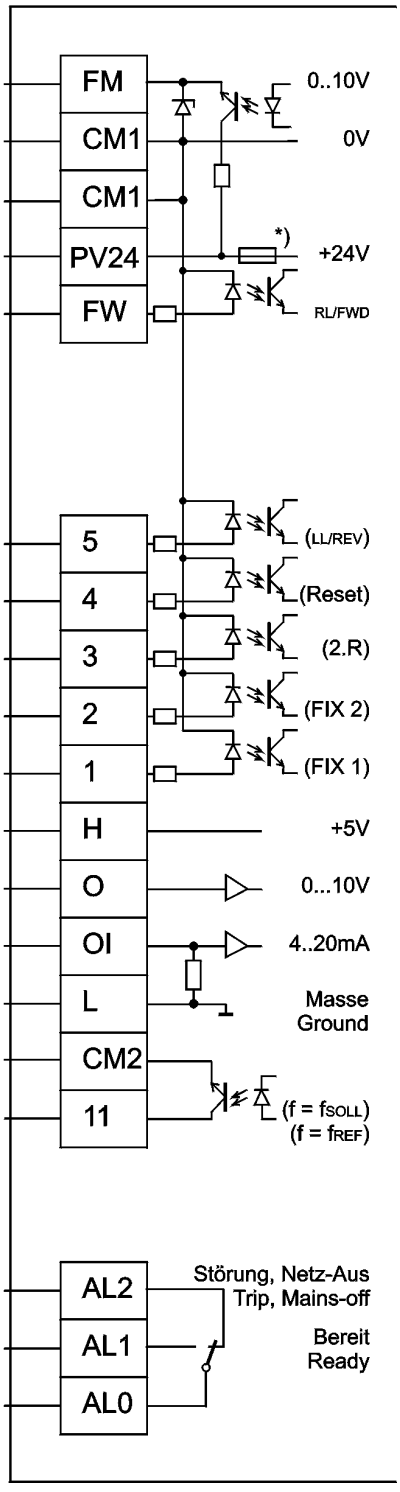
Externe Verdrahtung

External wiring



Interne Verdrahtung der Steuerklemmen

Internal wiring of the control terminals



Technical specification of the control terminals

1 - 5 Programmable digital inputs; +24V positive logic, app. 5 mA per input
The digital inputs 1-5 can be programmed with the parameters C0 - C4 as follows:
(With parameter C20 the inversion condition can be selected in addition !)

Setting	Short name	Description
0	REV	Start: forward run. REV and FW closed = STOP.
1 to 3	CF1 to CF3	Starts the inverter with the corresponding preset speed, if the contact is interconnected with PV24 (see parameter F2, page 9 or parameter A12-A17, A71, page 15).
4	DB	Enables the D.C.brake, if the contact is interconnected with PV24.
5	STN	All parameters are set back to their factory defaults.
6	SET	Activates the 2nd set of parameters for: freq. ref., voltage boost, accel. & decel. time, 2nd accel. & decel. time and control methods.
7	2CH	Activates the 2nd accel. & decel. time independent of SET.
8	FRS	Releases a coast to stop by interconnecting with PV24.
9	EXT	Releases an external trip by interconnecting with PV24.
10	USP	Avoids an automatic start after an undervoltage trip.
11	RS	Resets a trip.
12	SFT	Avoids the unauthorised change of parameters (software lock).

FW: Input for forward rotation. Interconnection with PV24 starts the inverter with clockwise rotation.
FW and REV closed = STOP.

PV24: 24 V potential for the digital inputs 1-5 and FW, max. 100 mA (SMT-fuse 125 V, 200 mA on the back-side of the control terminal PCB)

H: 5 V reference voltage for voltage source.

O: Voltage reference input: 0 - (5)10 V, input impedance: 30 kW

OI: Current reference input: 4 - 20 mA, input impedance: 250 W

L: 0 V potential for reference inputs

FM: Programmable output for: (couplings on to the signal lines may cause non-linearity. Switch a capacitor 2,2 to 100 nF between the terminals FM and CM1)

1.) Analogue frequency actual value: output signal proportional to the output frequency related to f_{MAX} (see F10, page 12), Accuracy: ± 5%, 0-10 V, 1 mA, pulse modulated

2.) Digital frequency actual value: digital frequency signal corresponding to the output frequency 10 V - pulses in 1:1 ratio.

3.) Analogue motor current: output signal prop. to the output current related to 200% I_{NOM}. (see F10, page 12), 0-10 V, 1 mA, pulse modulated

CM1: 0 V potential for frequency or motor current output FM

11: Programmable digital output (transistor output max. 27 VDC, 50 mA) for:
"Frequency reached" signal, RUN signal or overload signal

CM2: 0 V potential for programmable output 11

AL0: Potential for relay output
(minimum: 100 VAC / 10 mA or 5 VDC / 100 mA, maximum: 250 VAC/ 2,5 A or 30 VDC / 3 A)

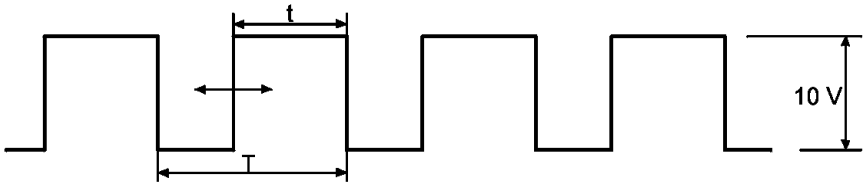
AL1: Closing contact

AL2: Opening contact

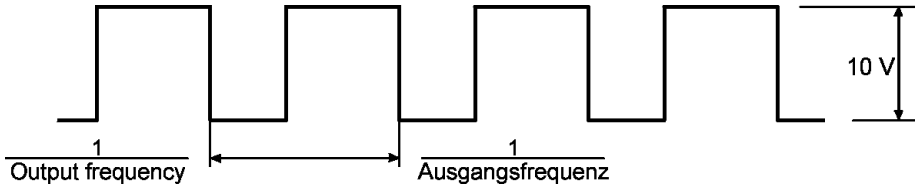
Terminal: FM — Affected parameter: A50, A51 and F10

The output can be programmed as follows (parameter A50 and A51):

1.) Analogue frequency actual value: (A50=1, A51=0)
Supplies a pulse width modulated signal, which is proportional to the output frequency related to the end frequency A63.
The accuracy is app. ± 5 %, the output supplies 0-10 V, 1 mA.
(see page 21)



2.) Digital frequency actual value: (A50=0, A51=0)
Supplies a digital frequency signal corresponding to the output frequency
The output supplies 10 V pulses in 1:1 ratio.



3.) Analogue motor current value (A50=1, A51=1)
Supplies a pulse width modulated signal proportional to the output current related to 200 % INOM.
The output supplies 0-10 V, 1 mA.
(see page 21)

Remarks:
- If A51=1 (current display), the supplied values will be analogue regardless of the adjustment of A50.
- Parameter F10 gives the possibility to adjust the output in a way, so that a connected measuring instrument shows the maximum value at full scale.

Functions: CF1, CF2, CF3 — Affected parameters: C0 - C4, F2, A12 - A17, A71

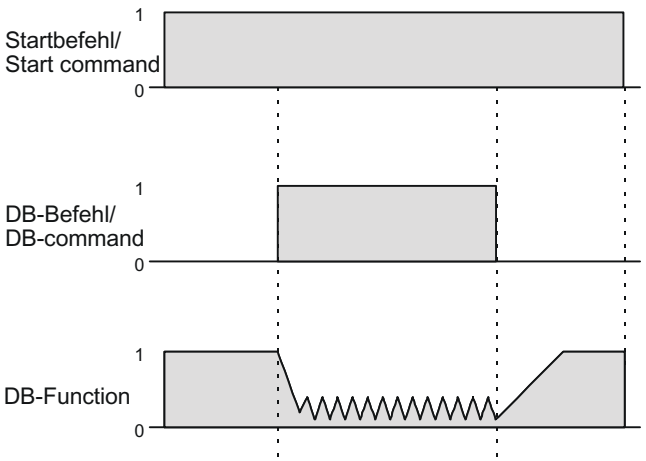
There are 2 possibilities to select up to 7 preset speeds. Before this the functions CF1 - CF3 have to be assigned to the programmable inputs 1-5. This is done with the parameters C0 - C4.
From the factory, the functions CF1 and CF2 are already assigned so that a number of 3 preset speeds can be selected.

1.) Parameter F2 in the 1st level of operation (see page 9)
2.) Parameter A12 - A17 and A71 (see page 15)

Remark:
Preset speeds always superimpose the actual speed reference, independent of the adjustment of parameter F9.

If the with DB programmed terminal is interconnected with PV24 a D.C. braking is released.
The braking force can be adjusted with parameter A21.
Independent of the setting of parameter A22 (braking time) and A56 (kind of braking) the following differences are valid:

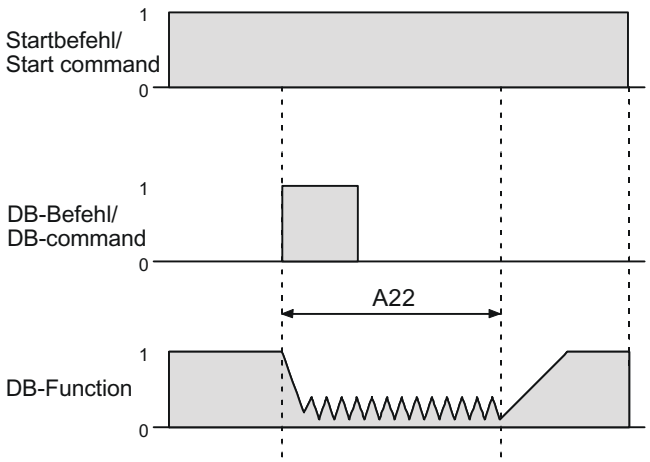
LEVEL-Function 1



Die GS-Bremsung wird mit dem Ende des DB-Befehls beendet.
Der Umrichter beschleunigt den Motor an der Hochlauframpe.

The DC-braking stops at the end of the DB-command.
The inverter accelerates the motor on the acceleration ramp.

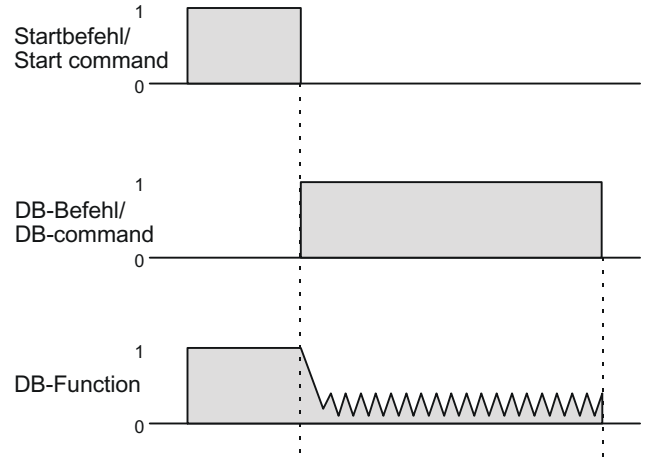
EDGE-Function 1



Die GS-Bremsung läuft, bis die eingestellte Zeit (A22) aus ist.
Der Umrichter beschleunigt den Motor an der Hochlauframpe.

The DC-braking stops when the adjusted time (A22) is over.
The inverter accelerates the motor on the accleration ramp.

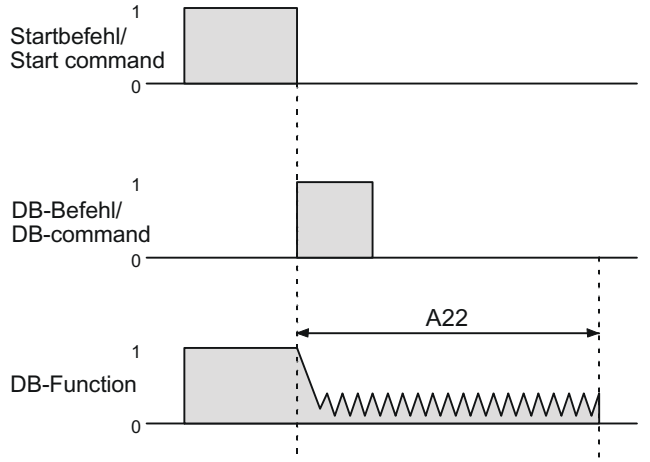
LEVEL-Function 2



Die GS-Bremsung läuft, solange der DB-Befehl ansteht.

The DC-braking works as long as the DB-command is present.

EDGE-Function 2



Die GS-Bremsung läuft, bis die eingestellte Zeit (A22) aus ist.

The DC-braking stops when the adjusted time (A22) is over.

Remarks:

- Parameter A22 also sets the braking time for the D.C. holding brake A55.
- Parameter A21 also sets the braking force for the D.C. holding brake A55.

Function: STN (factory default) — Affected parameters: C0 - C4

If the frequency inverter should be set back to its factory default setting, the following procedure must be done:

1.) Programm one of the inputs 1-5 with the parameters C0 - C4 to STN (setting: 05).
2.) Interconnect the programmed input with PV24 (either with a switch or with a wire bridge).
3.) Switch off the power supply.
4.) Wait until the charge control goes out and switch on the power supply afterwards.
5.) Wait for app. 6 s after switching on the power supply and then open the interconnection between STN and PV24.

Remarks:
- Instead of mains OFF/ON it is possible to release a reset to do the factory default setting. Therefore a second input must be programmed to the function RS (setting: 11).
- In both cases (mains OFF/ON or reset) wait for at least 6 s. Elsewhere the inverter will not be initialised correctly.
- If the software lock function is activated it is not possible to release a factory default setting.

Function: SET (2nd set of parameters) — Affected parameter: C0 - C4, A0 - A2, A18, A19, A62, A63, F2, F5 - F8

With this function it is possible to programm a 2nd independent set of parameters which includes the following:

F2	frequency reference value	A0	control method
F5	V/Hz - Characteristic	A1	Motor nominal power
F6	1st acceleration time	A2	Number of motor poles
F7	1st deceleration time	A18	2nd acceleration time
F8	voltage boost	A19	2nd deceleration time
		A62	Base frequency
		A63	End frequency

Programming the 2nd value

1.) Programm one of the inputs 1-5 to the function SET (setting: 06).
2.) Interconnect the programmed input with PV24.
3.) Select one of the above listed parameters. It will show its factory default value.
4.) Adjust a new (second) value and store it by pressing the FUNC key.
5.) Repeat the steps 3 and 4 for all other parameters you want to adjust.

Procedure

By interconnecting the programmed input with PV24 the 2nd set of parameters can be activated, opening the interconnection the 1st set is activated.

Remark
The frequency inverter has the possibility of a 2nd set of ramps (2CH) independent of the 2nd set of parameters (SET). In other words, the unit has 4 acceleration times and 4 deceleration times!!
If you change from the 1st to the 2nd set of parameters before the new value is stored by pressing the FUNC key, it might be possible that the new value is stored for both 1st and 2nd set. Therefore never change the set of parameters if you adjust a value!!
Switch the SET input before the start command (FW or REV). If both contacts are closed simultaneously, it might be possible that the 2nd set of parameters cannot be activated.

Function: 2CH (2nd set of ramps) Affected parameter: C0 - C4, A18, A19

As described at the function SET, the frequency inverter has a 2nd set of ramps. It can be activated independent of the 2nd set of parameters. That means the unit has 4 acceleration times and 4 deceleration times.

Programming the 2nd value

1.) Programm one of the inputs 1-5 to the function 2CH (setting: 07).
2.) Adjust for A18 (2nd acceleration time) and/or A19 (2nd deceleration time) another value as for F6 and/or F7.

Procedure

By interconnecting the programmed input with PV24 the 2nd set of ramps can be activated, which means that A18 and A19 are used instead of F6 and F7. Opening the interconnection activates the 1st set again.

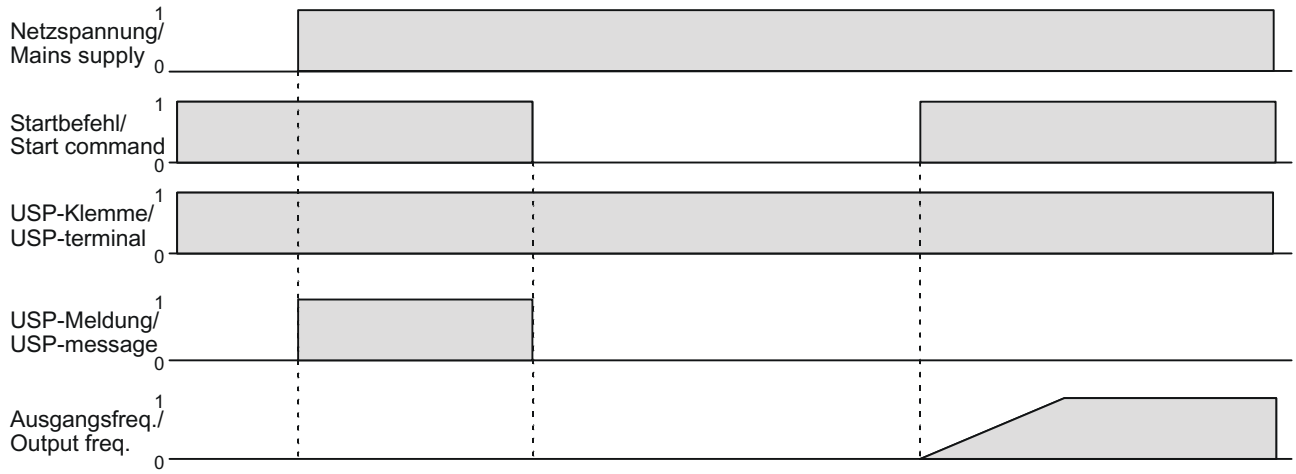
Remarks
- By switching to the 2nd set of ramps the 3rd and 4th acceleration and deceleration time can be activated.
- It is not possible to use all 4 values at the same time. They have to be selected by SET or 2CH.

Function: USP (restart lock) Affected parameter: C0 - C4

If the power supply is turned on or comes again after an undervoltage trip and the start command is active at the same time, the inverter will start immediately.
This can be avoided with the function USP. To do that, be sure that the function is assigned to one of the inputs 1-5 (parameter C0 - C4, setting: 10).

Remarks
- If the USP function is activated and the power supply comes back during a start command is released, the inverter trips with E13.
- If the start command is now switched off, the display will show „Err"; that does not mean that the error is cleared.
- The USP function is also executed after an undervoltage trip E9.

The following diagram shows the coherences:



Function: RS (reset) — Affected parameter: C0 - C4

Interconnecting the programmed input with PV24

1.) resets a fault
2.) leads to a factory default, if the function STN is programmed and interconnected too (see page 8)
3.) clears the trip memory, if A57 is set to "1" (see page 22)

Remarks
- If the RS contact is closed for more than 4 seconds, the inverter shows „- - -“. Open the RS contact and press one of the arrow keys to set the unit back to normal operation.
- The STOP/RESET key can only reset a trip and has no function 2 or 3 (see list above).
- Switching OFF/ON the power supply has the same effect as a reset.
- The inverter allows no continuous reset. That means, an inverter which operates without any failure will decelerate to 0 Hz if a reset signal is released. Pay attention to this, if the unit is used in plants, where all units are resetted with a single reset signal.

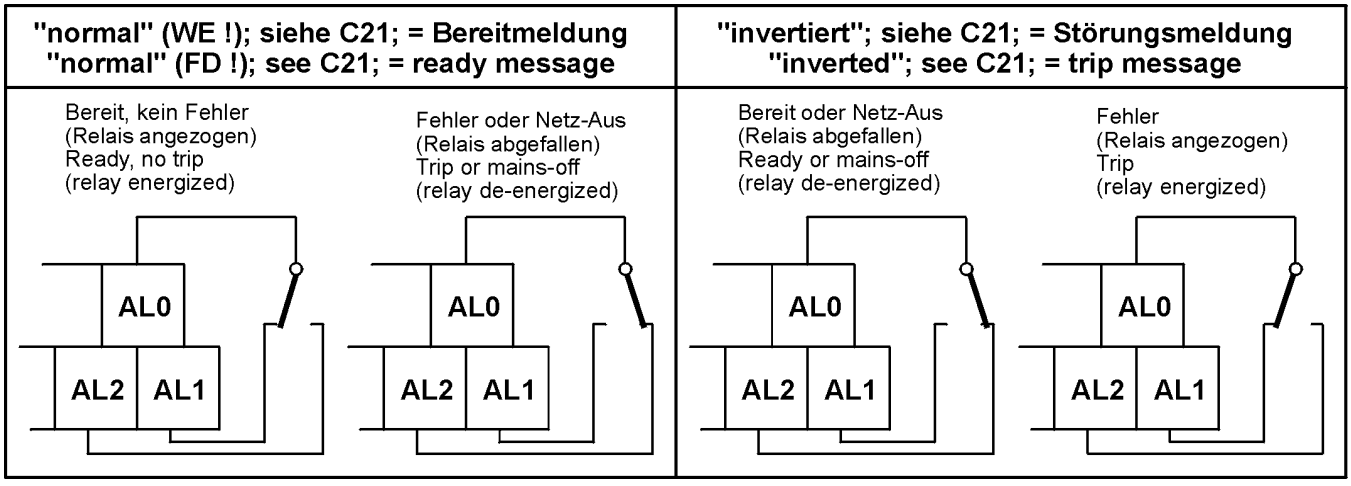
Function: SFT (software lock) — Affected parameter: C0 - C4

If SFT is programmed to one of the inputs 1-5 and interconnected with PV24, all parameters are secured against unauthorised change. This does not include the frequency reference value F2.

Remarks
- The change of the frequency reference value F2 can be avoided by setting parameter A53 to „1“.
- An alternative to the function SFT is the parameter A84.

Terminals: AL0, AL1, AL2 — Affected parameter: C21

In case of a trip the inverter shows an error code "E..." and the relay switches as follows:



Function	Mains	Cond.	Relay	AL0-AL1	AL0-AL2
„normal“ (Factory default)	ON	Ready	energized	closed	open
	ON	Trip	de-energized	open	closed
	OFF	-----	de-energized	open	closed

Function	Mains	Cond.	Relay	AL0-AL1	AL0-AL2
„invertiert“	ON	Ready	de-energized	open	closed
	ON	Trip	energized	closed	open
	OFF	-----	de-energized	open	closed

Wiring examples

Manual control via the built-in keypad

Adjust the following parameters: F9 = 00, F2 = frequency reference value, F4 = pre-selection of rotation direction, F6 = acceleration time, F7 = deceleration time

It is not necessary to connect any control terminals!!

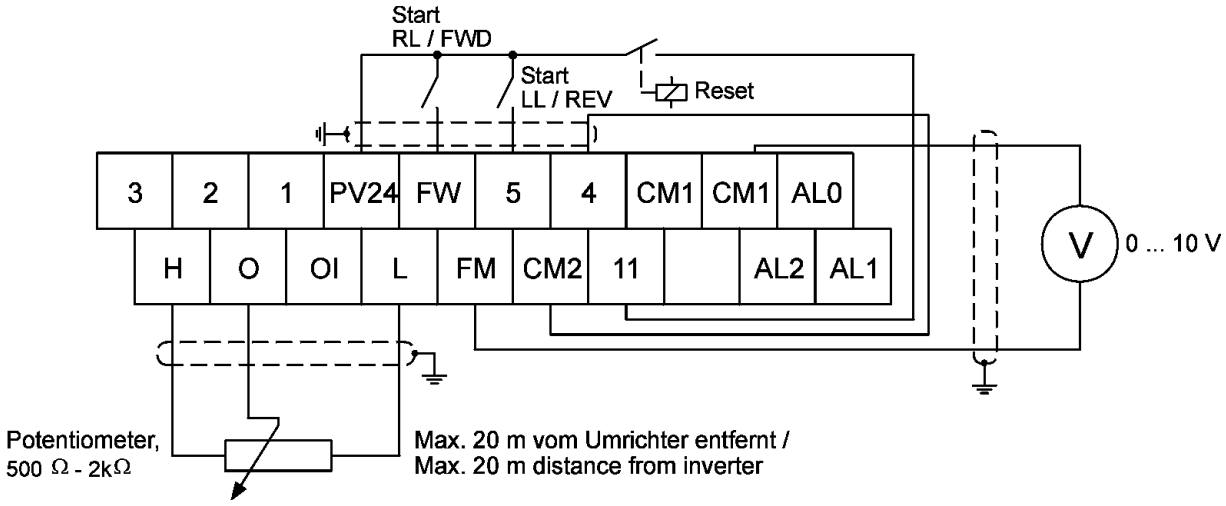
After the above mentioned parameters have been adjusted, the frequency inverter can be started with the RUN key. The STOP key stops the equipment or resets a trip. Of course, it is possible to adjust any other parameter.

The last adjusted speed reference value (F2) is stored even after mains OFF!!

Reference value from a potentiometer & summation-reset

Adjust the following parameters: F9 = 03 (FD !), A0 = U/f or SVC, F6 = acceleration time, F7 = deceleration time, C4 = 0
Additional for summation-reset: C3 = 11 (FD !), C10 = 01 (RUN-signal on terminal 11), C21 = 03 (FD !)

Wiring of the control terminals:



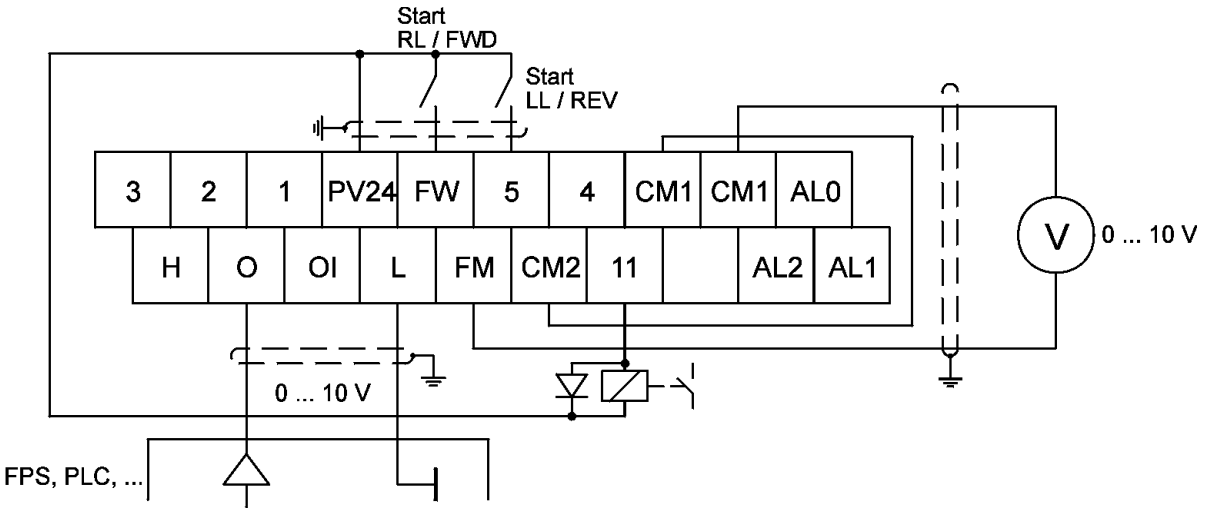
After the above mentioned parameters have been adjusted, the frequency inverter can be started via the input FW in clock-wise direction. Input 5 (= REV) will start the equipment in anti-clockwise direction. Closing FW and REV at the same time will cause to stop the inverter.

By using the terminal 11 in combination with the reset signal a general reset will have no effect to a running inverter.

Reference value from a 0 ... 10 V analogue signal & supply via the internal 24 V

Adjust the following parameters: F9 = 03 (FD !), A0 = U/f or SVC, F6 = acceleration time, F7 = deceleration time, A48 = 0 for 5 V signal or = 1 for 10 V, C4 = 0

Wiring of the control terminals:

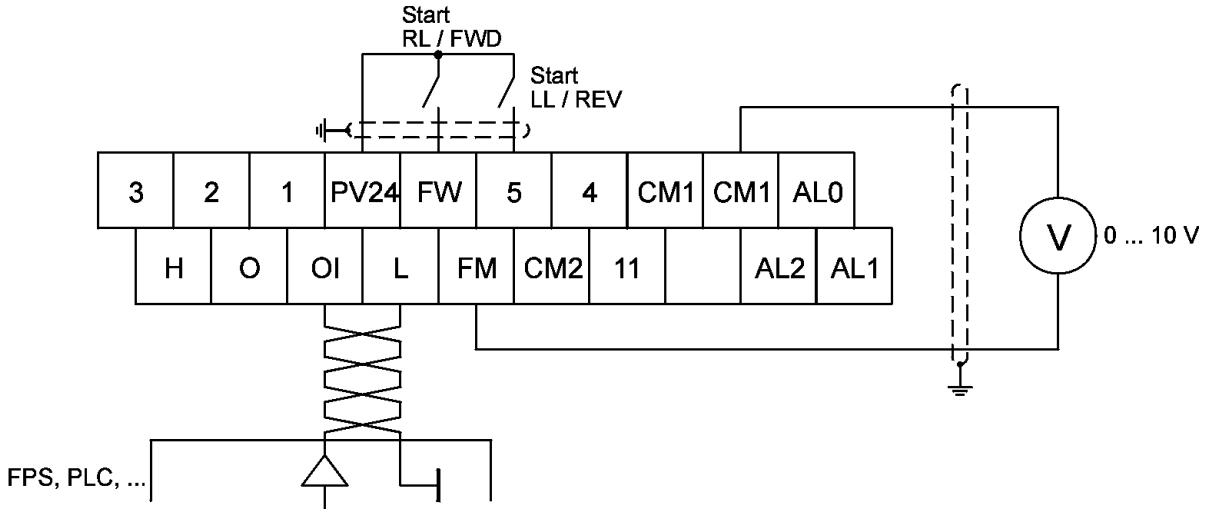


After the above mentioned parameters have been adjusted, the frequency inverter can be started via the input FW in clockwise direction. Input 5 (= REV) will start the equipment in anti-clockwise direction. Closing FW and REV at the same time will cause to stop the inverter.

Remark:
Use a relay with max. 50 mA charging rate at 24 V.

Reference value from a 4 ..... 20 mA analogue signal

Adjust the following parameters: F9 = 03 (FD !), A0 = U/f or SVC, F6 = acceleration time, F7 = deceleration time, C4 = 0

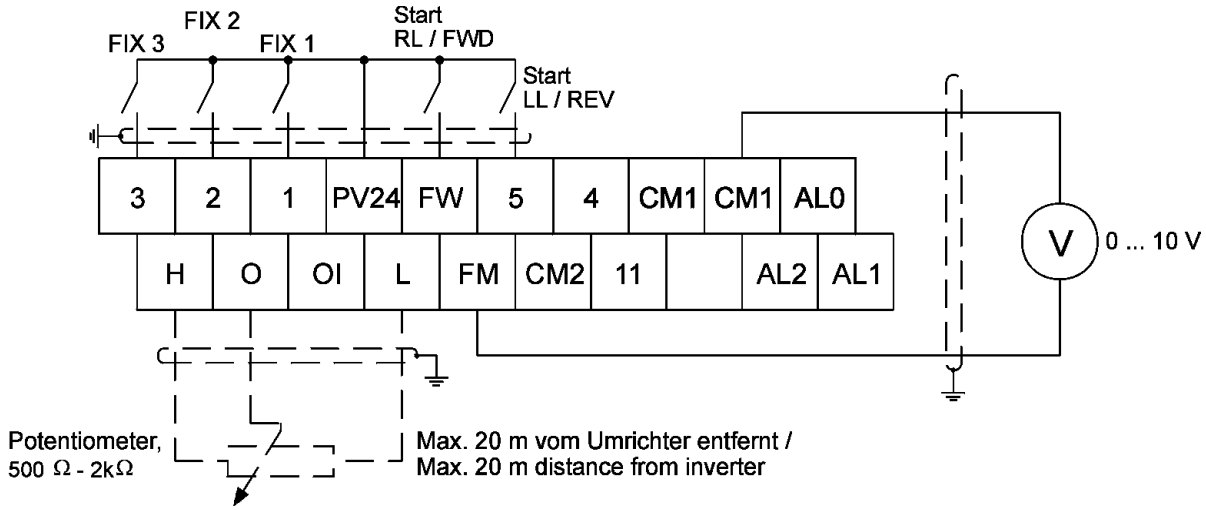


Wiring of the control terminals:
After the above mentioned parameters have been adjusted, the frequency inverter can be started via the input FW in clockwise direction. Input 5 (= REV) will start the equipment in anti-clockwise direction. Closing FW and REV at the same time will cause to stop the inverter.
Voltage and current reference value are added if they are connected at the same time. If only one reference value should be used, be sure that the other one is not connected at the same time. There is no switch over between voltage and current reference value!!

Preset speeds (max. 7) + reference value (corresp. "FIX 8")

Adjust the following parameters: F9 = 03 (FD !), A0 = U/f or SVC, F6 = acceleration time,
F7 = deceleration time, C0 = 1, C1 = 2, C2 = 3, C4 = 0
A12 = preset speed 1, A13 = preset speed 2, A14 = preset speed 3,
A15 = preset speed 4, A16 = preset speed 5, A17 = preset speed 6,
A71 = preset speed 7,
F2 = standard reference value (or potentiometer, or 0 ... 10 V, a.s.o.)

Wiring of the control terminals:



After the above mentioned parameters have been adjusted, the frequency inverter can be started via the input FW in clockwise direction. Input 5 (= REV) will start the equipment in anti-clockwise direction. Closing FW and REV at the same time will cause to stop the inverter.
If one of the preset speed inputs is interconnected with PV24 the actual reference value is superimposed. The frequency inverter accelerates or decelerates the motor to the new speed value. The combination of the preset speed inputs can be read at the description of parameters F2 or A12 - A17, A71.

Technical data ELVOvert PX

General

Size		1	2	3		
Type	ELVOvert PX 220/	0,4C	0,7C	1,5C	2,2C	-
	ELVOvert PX 400/	-	-	1,5C	2,2C	4,0C
Motor rating	typical (max.)	0,37(0,55 kW)	0,75(1,1 kW)	1,5 kW	2,2 kW	4,0 kW
Output power	PX 220	1,1 kVA	1,9 kVA	2,9 kVA	4,0 kVA	-
	PX 400	-	-	2,6 kVA	3,6 kVA	6,0 kVA
Nominal output current	PX 220	3,0 A	5,0 A	7,5 A	10,5 A	-
	PX 400	-	-	3,8 A	5,3 A	8,6 A
Max. continuous current	PX 220	3,6 A	6,0 A	9,0 A	12,6 A	-
(at 8 kHz switch. freq.)	PX 400	-	-	4,6 A	6,4 A	10,3 A
Maximum current		150 % IN for 60 s in 10 min				

Mechanical data

Mechanical construction		Built-in unit for vertical mounting, protection degree IP 20				
Cooling		natural (from 1.5 kW forced)				
Dimensions	Height [mm]	170				
	W x D [mm]	128 x 93	145 x 103	220 x 146	220 x 146	220 x 146
Weight	app.	1,3 kg	1,5 kg	3,0 kg	3,2 kg	3,2 kg

Frequency inverter

Mains voltage	PX 220	1 AC, 220 - 240 V ± 10 %, 50 / 60 Hz ± 5 %
	PX 400	3 AC, 380 - 415 V ± 10 %, 50 Hz or 400 - 460 V ± 10 %, 60 Hz ± 5 %
Output	- Voltage	3 AC, 0 ... 220 - 240 V or 0 ... 380 - 460 V
	- Frequency	0,5 ... 120 (375) Hz
	- Freq. of max. voltage	V/f - characteristic variably adjustable
	- Min. load, overload	no load proof, short circuit and earth fault protected by overcurrent trip
Braking-unit		built-in for 100 - 150 % TB with external braking resistor
DC-braking		braking torque and braking time are adjustable
Frequency resolution		digital 0,1 Hz / 50 Hz, analogue inputs 0,1 Hz / 50 Hz
Frequency accuracy		digital ± 0,01 % / 50 Hz; analogue ± 0, 2 % / 50 Hz
Ambient temperature		- 10....+ 40°C (- 10....+ 50°C without cover)
Air humidity		20 - 90 %, no condensing
Height		up to 1000 m, above with derating 1 % per 100 m

Drive modulation and control

Procedure		V / f characteristic-control switchable to SVC (Sensorless-Vector-Control)
Switching frequency		16 kHz, reduceable in steps to 5 kHz
Control	- manual	with built-in operating panel
	- 1 analogue input	0...+ (5) 10 V, 4 ... 20 mA related to 0V, Ri = 30 kΩ or 250 Ω
	- 6 digital inputs	4 programmable, + 24 V positive logic
	- 1 analogue output	0 - 10 V, 1 mA, pulse width modulated, programmable as frequency signal
	- 1 digital output	open-collector-output, 27 V DC, 50 mA, isolated, programmable
	- 1 dig. relay output	1 change over, 250 V AC, 1 A or 30 V DC, 1 A
Auxiliary voltages	- reference voltage	+5 V, max. 10 mA, short circuit protected
	- auxiliary voltage	+24 V, max. 60 mA, short circuit protected
Protection - Trips		for overcurrent, over- and undervoltage, earth fault, over temperature, braking unit, ...

Error displays

The frequency inverters have protection functions against i.e. overcurrent, overvoltage and undervoltage. In case of a trip the output voltage is switched off, the motor coasts to a stop and the inverter stays in the trip condition mode until a reset is released.

No.	Trip	Possible cause	Remedy actions
E1	Overcurrent or overtemperature of the IPM´s in static operation	Sudden load spikes, stalling motor, short circuit on the motor terminals, earth fault	Avoid sudden overloads, select inverter and motor with more power capacity, check motor cable and motor for short circuit or earth fault
E3	Overcurrent or overtemperature of the IPM´s during acceleration	Too short adjusted acceleration time, short circuit on the motor terminals, earth fault, too high adjusted voltage boost, stalling motor	Increase acceleration time, check motor cables and motor for short circuit or earth fault, decrease voltage boost, check the load or starting torque
E2	Overcurrent or overtemperature during deceleration	Too short adjusted deceleration time, short circuit on the motor terminals, earth fault	Increase deceleration time, check motor cables and motor for short circuit or earth fault
E4	Overcurrent or overtemperature during stand still	Too high ambient temperature	Check ambient conditions
E5	Release of the internal motor protection	Motor overload	Select an inverter and motor with higher power capacity
E6	Braking unit switch-on time exceeded	Too short adjusted deceleration time, no braking resistor connected	Increase deceleration time, connect a braking resistor
E7	DC link overvoltage	Too short adjusted deceleration time, motor in the generator-mode	Increase deceleration, use a braking resistor or avoid this kind of operation
E8	EEPROM error	Above-average high data storage, power supply loss during data storage, high electromagnetic fields or too high ambient temperatures	The EEPROM´s life time is app. 10000 storage's (related to 10 years with a few storage's a day)
E9	Mains undervoltage	Wrong mains voltage, short mains losses	Check input voltage
E10		Defect on the CT´s	
E11	Faulty calculator	electromagnetic fields, faulty frequency inverter	Check for possible external disturbances, contact the customer service
E12	External trip	Caused by the user or fault in the reference values	Check the reference values

No.	Trip	Possible cause	Remedy actions
E13	Restart protection activated	Mains switch-on with activated lock or mains loss with activated lock	The corresp. terminal must not be interconnected before switching on the mains, check the mains voltage supply
E14	Earth fault on the motor terminals	Earth fault	Remedy the earth fault and check the motor
—-	Communication fault	Faulty communication between inverter and the keypad	Press one of the arrow keys or the FUNC key or switch off the power supply
	Inverter cannot be controlled via the control terminals, but can be controlled via the keypad, even though the parameter F9 is adjusted correctly	Short circuit between PV24 and CM1 or blown fuse for the control voltage PV24	Check if PV24 is short circuited or if the fuse for the control voltage on the backside of the control terminal PCB has blown

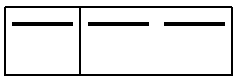
Error messages can be removed by a reset. There are several possibilities:

- Link the programmed input for short time with PV24.
- Press the STOP/RESET key on the keypad.
- Switch off the power supply.

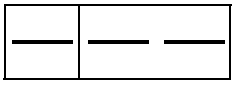
Remark: An inverter which operates without any failure, will decelerate to 0 Hz if an reset signal is released !!

If the error message stays after a reset was released, please call your customer service department or the supplier of the unit.

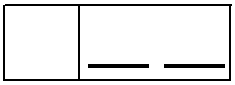
Further displays:



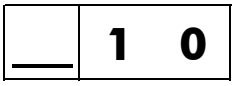
The reset input is interconnected with PV24 for more than 4 seconds.
Pressing one of the arrow keys recovers, if not, switch on-off the power supply.



Display if the power supply is switched off.



Shows that a value was changed.
i.e if a control method was selected with A0 after V/f was selected with F5, F5 will show „ __“

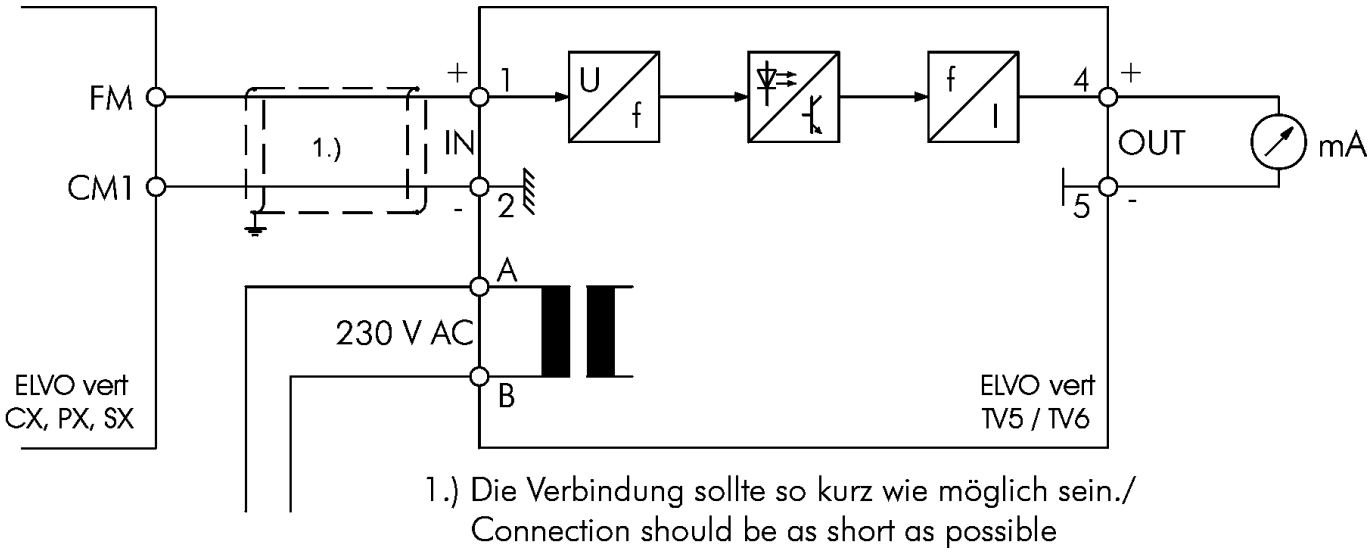


Shows the remaining retry waiting time after the power recovery of undervoltage when selecting the retry mode.

Option TV5 and TV6

The ELVOvert TV5 is an active isolating amplifier which transforms the input signal (0-10 V) to an output signal (4-20 mA).
The ELVOvert TV6 is an active isolating amplifier which transforms the input signal (0-10 V) to an output signal (0-20 mA).
It operates according to the principle of optoelectronic potential seperation and has three-way seperation between input, output and supply.
The unit requires an auxillary supply of 230 V AC.
The mounting is done on support rails TS35.

The device works unipolar and should not be operated with open input.



1.) Die Verbindung sollte so kurz wie möglich sein./
Connection should be as short as possible

Technische Daten

Auxillary supply	230 V ±10 %, 50-60 Hz
Power consumption	3 VA
Voltage input	0 ... 10 V / R_{IN} = 100 kΩ
Overload capability	max. 50 V
Current output TV5	4 ... 20 mA
Current output TV6	0 ... 20 mA
Output burden	max. 500 Ω
Max. Isolating voltage	750 V
Transmission frequency	25 Hz
Linear fault	0,15 %
Ambient temperature	0 ... 50°C
Weight	270 g
Dimensions (H x B x T)	117mm x 45mm x 80mm

ELVO*vert* PX - Frequency inverter
Commissioning protocol

Type:	❑ PX 220/0,4C	❑ PX 220/0,7C	❑ PX 220/1,5C	❑ PX 220/2,2C
	❑ PX 400/1,5C	❑ PX 400/2,2C	❑ PX 400/4,0C	

Serial number:

Customer / Company:	**Supplier / Company:**
Delivery date:	**Commissioning date:**

Parameter adjustments

1st level of operation

Parameter	No.	Factory default	Customers´ setting
Actual values	F1	None	
Frequency reference value, preset speeds	F2	0.0 Hz	
Motor direction pre-selection	F4	F	
V/f characteristic selection	F5	08 (220 V) / 00 (400 V)	
1st acceleration time	F6	10 s (220 V) / 15 s (400 V)	
1st deceleration time	F7	10 s (220 V) / 15 s (400 V)	
Voltage boost	F8	11	
Operating mode: Ref.value, start, stop	F9	03	
Analogue meter adjustment	F10	72	
Motor nominal voltage	F11	220 V (220 V) / 380 V (400 V)	
2nd level of operation	F14	A0	

2nd level of operation

Parameter	No.	Factory default	Customers´ setting
Operating method	A0	0 (= V/f)	
Motor capacity setting	A1	Inverter nom. power	
Pole number	A2	4 poles	
fMAX increase	A3	0.0 Hz	
Starting frequency	A4	0.5 Hz	
fMAX limitation	A5	0.0 Hz	
fMIN limitation	A6	0.0 Hz	
Skip frequency 1	A7	0.0 Hz	
Skip frequency 2	A8	0.0 Hz	
Skip frequency 3	A9	0.0 Hz	
Carrier frequency	A10	16 kHz	
Frequency command sampling	A11	8	
Preset speed 1	A12	0.0 Hz	
Preset speed 2	A13	0.0 Hz	
Preset speed 3	A14	0.0 Hz	
Preset speed 4	A15	0.0 Hz	
Preset speed 5	A16	0.0 Hz	
Preset speed 6	A17	0.0 Hz	
2nd acceleration time	A18	10.0 sec	
2nd deceleration time	A19	10.0 sec	
DC brake: fSTART	A20	0.5 Hz	

Parameter	No.	Factory default	Customers´ setting
DC brake: Power	A21	0	
DC brake: Time	A22	0.0 sec	
Electronic motor protection	A23	100 %	
Motor protection characteristic	A24	1 (= constant torque)	
Ext. fREF: start value	A26	0 Hz	
Ext. fREF: end value	A27	0 Hz	
Acceleration: Linear or s-ramp	A28	0 (= linear)	
Deceleration: Linear or s-ramp	A29	0 (= linear)	
Overcurrent signal: Adjustment	A30	150 %	
Current limitation: Adjustment	A31	150 %	
Current limitation: Content	A32	0 (= during ACCEL)	
LAD function: ON / OFF	A33	0 (= active)	
Restart selection	A34	0 (= display & signal)	
U<< detection: Y / N	A35	0 (= NO)	
AVR at deceleration: Y / N	A36	0 (= NO)	
UMOTOR at DECEL	A37	220* / 380**	
Braking unit: Switch-on time	A38	5.0 %	
Frequency arrival signal: ON-level	A39	100 %	
Frequency arrival signal: OFF-level	A40	100 %	
FWD lock: ON / OFF	A41	1 (= OFF)	
REV lock: ON / OFF	A42	1 (= OFF)	
STOP key: ON / OFF	A43	0 (= OFF)	
Analogue input: 0-5 V / 0-10 V	A48	0 (= 5 V)	
Frequency arrival signal: Characteristic	A49	2 (= f=fREF)	
Analogue / digital signal	A50	1 (= analogue)	
Analogue output: frequency / current	A51	0 (= frequency)	
RUN message selection	A52	1 (=during running)	
fREF change at softlock	A53	0 (= YES)	
DC brake: ON / OFF	A55	0 (= OFF)	
DC brake: Selection	A56	1 (= level)	
Clear trip memory: Y / N	A57	0 (= NO)	
Start with reduced voltage	A58	1 (= YES)	
Base frequency	A62	50 Hz	
End frequency	A63	50 Hz	
Maximum frequency	A64	0 (=120 Hz)	
Skip frequency range	A68	0.5 Hz	
Preset speed 7	A71	0 Hz	
fREF: Voltage calibration	A80	Pre-adjusted!!	Do not change!!
fREF: Current calibration	A81	Pre-adjusted!!	Do not change!!
Allowed undervoltage time	A82	1.0 sec	
Waiting time for restart	A83	10.0 sec	
Softlock: ON / OFF	A84	0 (= OFF)	
Deceleration time for current limitation	A85	1.0 sec	
Setting for input 1	C0	1	
Setting for input 2	C1	2	
Setting for input 3	C2	7	
Setting for input 4	C3	11	
Setting for input 5	C4	0	
Setting for output 11	C10	0 (= frequency arrival)	
Inputs 1-5: Inversion	C20	00 (= N.C.)	
Output 11and relay: Inversion	C21	03 (= i / n)	

Recommendation of the manufacturer to the CE-marking

- In combination with the filter options ELVO*vert* CE the frequency inverters ELVO*vert* PX correspond to the EMC-directive 89/336/EWG and the low-voltage directive 73/23/EWG.

  that means EN 61800-3 and
  conformity with: EN 50178

- The EMC product standard for PDS (Power-Drive-Systems) EN 61800-3 distinguishes between:

  Unrestricted distribution, where the supply of equipment is not dependent on the EMC compedence of the customer or user for the application of drives (e.g. catalogue sale,...)

  Restricted distribution, where the manufacturer restricts the supply of equipment to suppliers, customers or users who separately or jointly have technical compedence in the EMC requirements of the application of drives.

- Furthermore there is a differentiation between:

  First enviroment (domestic premises)
  That are establishments directly connected without intermediate transformers to a low-voltage power network which supplies buildings used for domestic purposes.

  Second enviroment (industral permises)
  That are all establishments other than those directly connected to a low-voltage power network which supplies buildings used for domestic purposes.

The prescribed installation regulations and the therefore necessary options for both, enviroment and distribution channel, are described in the manual „Additional installation regulations PX, SX“ (8074578) in detail. Only under supervisions of these remarks the CE conformity of the ELVO*vert* PX can be fulfilled.

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