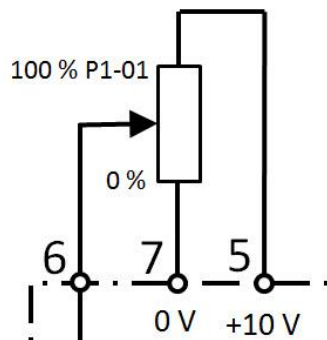


PowerXL™

DA1 Variable Frequency Drives Set Point Setting



Level 2	<p>1 – Fundamental – No previous experience necessary</p> <p>2 – Basic – Basic knowledge recommended</p> <p>3 – Advanced – Reasonable knowledge required</p> <p>4 – Expert – Good experience recommended</p>
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Content

1	General	5
1.1	Settings in Hz or rpm	5
1.2	Upper and lower speed limit	6
1.3	Behavior during change over between reference sources	6
1.4	Skip frequencies to avoid resonances	7
2	Analog reference	8
2.1	Selecting the sense of rotation.....	8
2.2	Format of the analog value	8
3	Fixed frequencies	9
3.1	Setting the frequency value	9
3.2	Selecting the sense of rotation.....	9
3.3	Selecting the fixed frequency.....	9
3.3.1	Selection with predefined terminal configurations (P1-13).....	10
3.3.2	Use of fixed frequencies in device functions.....	11
3.3.3	User defined selection.....	12
3.3.4	Example: Eight fixed frequencies, user defined	13
4	Set point setting with a frequency	14
5	Digital reference	15
5.1	Configuration.....	16
5.1.1	Terminals / Keypad.....	16
5.1.2	Reference at start and at changeover between speed sources.....	18
5.2	Operation	20
5.2.1	Starting / Stopping.....	20
5.2.2	Increase / reduce speed	20
5.2.3	Change sense of rotation	21
6	User defined configuration	22
6.1	Speed sources.....	22
6.1.1	Possible speed sources.....	22
6.1.2	Selecting the speed source.....	23
6.1.3	Example: four speed sources, user defined	24
6.1.4	Starting, Stopping, Sense of rotation	24

Danger! - Dangerous electrical voltage!

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA/IL) for the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automatic control functions.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specification, otherwise this may cause malfunction and/or dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes. Unlatching of the emergency-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been properly installed and with the housing closed.
- Wherever faults may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (e.g. by means of separate limit switches, mechanical interlocks etc.).
- Frequency inverters may have hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or frequency inverter may destroy the device and may lead to serious injury or damage.
- The applicable national safety regulations and accident prevention recommendations must be applied to all work carried on live frequency inverters.
- The electrical installation must be carried out in accordance with the relevant electrical regulations (e.g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing frequency inverters must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the frequency inverters using the operating software are permitted.
- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the frequency inverter (increased motor speed or sudden standstill of motor). These measures include:
 - Other independent devices for monitoring safety related variables (speed, travel, end positions etc.).
 - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
 - Never touch live parts or cable connections of the frequency inverter after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be alive after disconnection. Consider appropriate warning signs.

Disclaimer

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1 General

Variable frequency drives of the series **PowerXL™ DA1** are used for the speed control of asynchronous motors. The speed set point can be provided in different ways:

- via an analog signal at the control terminals
- as a fixed frequency value, which is selected by a digital command
- as a digital reference, which is adjusted via keypad or control terminals
- via a frequency signal at the terminals
- via a connected fieldbus.

These possibilities are the same for all DA1 power ratings.

This Application Note describes:

- the different ways of set point setting
- the handling of the references
- user specific configuration possibilities

Set point setting via fieldbus is not handled inside this Application Note.

Further information:

AP040034EN I/O Configuration describes:

- the existing input and output terminals
- the possibility to extend the number of I/Os
- the technical data
- the assignment of functions to terminals

AP040030EN Starting, Stopping and Operation describes:

- the different possibilities at starting and stopping
- the respective control commands
- the setting of the relevant parameters
- the behavior in case of a fault

Some required parameters are inside Level 3 of the menu. This level has to be activated by prompting the "Password Level3" (P6-30) into P1-14 (Password). Password Level3 is "201" by default.

1.1 Settings in Hz or rpm

Parameter P1-10 „Motor Nom Speed“ determines, if the setting is done in Hz or rpm:

P1-10 = 0: Setting / display of the output frequency in Hz

P1-10 > 0: all speed related parameters (P1-01, P1-02, P2-01 ... P2-08, P4-10 ...) are set and displayed in rpm.

PNU	Parameter	Name	Range	Default
217.0	P1-10	Motor Nom Speed	0 / 200 ... 30000 rpm	0 rpm

1.2 Upper and lower speed limit

The speed range of the connected motor is determined by the parameters “f-min” (P1-02) and “f-max” (P1-01). The reference is linear between these two values.

Please note, that the value of P1-01 cannot be exceeded, even when multiple references are added up. The value of P1-02 cannot be undercut. This is true for both senses of rotation.

$$\text{Frequency respectively speed} = P1-02 + (\text{set point}_{\text{actual}} / \text{set point}_{\text{max}}) \cdot (P1-01 - P1-02)$$

Example 1:

P1-10 = 0 (setting / display in Hz)

P1-01 = 50 Hz

P1-02 = 0.0 Hz

Set point via analog input: 0 ... 10 V

Set point actually set: 5 V

$$\text{Frequency} = 0 \text{ Hz} + (5 \text{ V} / 10 \text{ V}) \cdot (50 \text{ Hz} - 0 \text{ Hz}) = 0 \text{ Hz} + 0.5 \cdot 50 \text{ Hz} = 25 \text{ Hz}$$

Example 2:

P1-10 = 1470 rpm (setting / display in rpm)

P1-01 = 1470 rpm

P1-02 = 300 rpm

Set point via analog input: 0 ... 10 V

Set point actually set: 5 V

$$\text{Speed} = 300 \text{ rpm} + (5 \text{ V} / 10 \text{ V}) \cdot (1470 \text{ rpm} - 300 \text{ rpm}) = 300 \text{ rpm} + 0.5 \cdot 1170 \text{ rpm} = 885 \text{ rpm}$$

PNU	Parameter	Name	Range	Default
20.1	P1-01	f-max	P1-02 ... 5 · P1-09 (500 Hz max)	50.0 Hz
20.0	P1-02	f-min	0.0 Hz ... P1-01	0.0 Hz

Note:

- With values of P1-10 > 0 the setting is done in rpm instead of Hz.
- The value, which can be set with P1-01 „f-max“, is limited to five times „Motor Nom Frequency“ (P1-09) with a maximum of 500 Hz.
- In case the set point value is provided with an analog signal -10 ... + 10 V, „f-min“ (P1-02) must be set to zero.

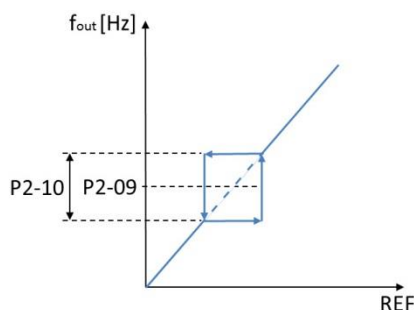
1.3 Behavior during change over between reference sources

During a change over between two reference sources, e.g. from an analog signal to a fixed frequency, the new reference is approached with the actual ramp. In most cases the ramp times are determined by “t-acc” (P1-03) for acceleration and “t-dec” (P1-04) for deceleration.

Further information about the use of multiple ramps, see Application Note “Use of multiple ramps” (AP040031EN).

1.4 Skip frequencies to avoid resonances

In some applications an operation of the motor in a certain frequency band leads to mechanical resonances, which can end up in a destruction of machine parts. The devices of the series **PowerXL™ DA1** have the possibility to skip this frequency band for steady operation to avoid this effect.



Fading out frequencies is possible with all kind of reference signals, not depending on where they come from, e.g. analog input, fixed frequency, output of a PI controller, digital reference ... , whatever is selected.

The band width is determined by P2-10 “f-SkipBand1”, while the center point is defined by P2-09 “f-Skip1”. The diagram on the left hand side shows the behavior. Setting P2-10 to zero, deactivates the function.

REF = Reference value

Example:

A motor runs up to 50 Hz. In the range between 15 Hz and 25 Hz mechanical resonances can occur. Therefore the motor may not run inside this range steadily.

Band width: $P2-10 = 25 \text{ Hz} - 15 \text{ Hz} = 10 \text{ Hz}$

Center point: $P2-09 = \frac{15 \text{ Hz} + 25 \text{ Hz}}{2} = 20 \text{ Hz}$

How it works:

The reference is below the disabled range. → Drive runs with the set frequency. → Increase of reference into the disabled range → Motor accelerates and remains at the lower limit (in this example: 15 Hz). → Increase of reference above the disabled range → Motor accelerates with the ramp, set with P1-03 “t-acc” to the new speed. → Motor operates above the disabled range according to the reference. → Reduction of reference into the disabled area → Motor decelerates and remains at the upper limit (in this example: 25 Hz). → Reduction of reference below the disabled area → Motor decelerates with the ramp, set with P1-04 “t-dec” to the new speed.

PNU	Parameter	Name	Range	Default
22.0	P2-10	f-SkipBand1	0...P1-01	0 Hz ¹⁾
21.0	P2-09	f-Skip1	0...P1-01	0Hz ¹⁾

¹⁾ The default setting of P1-10 “Motor Nom Speed” = 0. In this case the values for P2-09 and P2-10 are given in Hz. When P1-10 is different from „0“, P1-09 and P1-10 have to be set in min⁻¹.

2 Analog reference

Variable frequency drives of the series DA1 have two analog inputs:

- Analog input AI1 terminal 6
- Analog input AI2 terminal 10

The configuration of the inputs and outputs is described inside the Application Note „I/O Configuration“ (AP040034EN). Beside the setting of the signal format (voltage or current), offset and a scaling factor can be used to adopt the speed to the input signal.

2.1 Selecting the sense of rotation

The analog value at the respective terminal determines the amount of speed.

The control commands FWD and REV select clockwise or counter clockwise sense of rotation. If a change of sense is required, the actual command (e.g. FWD) has to be removed first, before applying the other one (e.g. REV). Applying FWD and REV simultaneously leads to a Quick Stop with the ramp set with “t-QuickDec” P2-25.

When using a reference signal of -10 V ... +10 V (- 10- 10) the sense of rotation is determined by the polarity of the signal.

2.2 Format of the analog value

The speed reference signal can be a voltage signal as well as a current one. It is invertible and thus the maximum speed can be selected with the minimum analog signal level and vice versa.

Format	counter clockwise rotation		clockwise rotation	
	f-min	f-max	f-min	f-max
0 ... 10 V (U 0-10)	0 V + REV	10 V + REV	0 V + FWD	10 V + FWD
10 ... 0 V (U 10-0)	10 V + REV	0 V + REV	10 V + FWD	0 V + FWD
-10 V ... +10 V (- 10- 10)*	0 V	+10 V + REV -10 V + FWD	0 V	+10 V + FWD -10 V + REV
0 ... 20 mA (A 0-20)	0 mA + REV	20 mA + REV	0 mA + FWD	20 mA + FWD
4 ... 20 mA (I 4-20)	4 mA + REV	20 mA + REV	4 mA + FWD	20 mA + FWD
4 ... 20 mA (r 4-20)	4 mA + REV	20 mA + REV	4 mA + FWD	20 mA + FWD
20 ... 4 mA (I 20-4)	20 mA + REV	4 mA + REV	20 mA + FWD	4 mA + FWD
20 ... 4 mA (r 20-4)	20 mA + REV	4 mA + REV	20 mA + FWD	4 mA + FWD

*When selecting -10 V ... +10 V, the minimum frequency (P1-02) must be set to zero!

Note: In case a terminal configuration without the commands FWD and REV is selected with P1-13, the sense of rotation is set with the commands START and DIR.

- Clockwise rotation → START
- Counter clockwise rotation → START + DIR

3 Fixed frequencies

Fixed frequencies are references, which are set once, e.g. during commissioning and which can be selected by a digital command when required. The devices of the series DA1 have up to 8 fixed frequencies f-Fix1 ... f-Fix8, which can be selected independently.

3.1 Setting the frequency value

The setting of the fixed frequencies is done with P2-01 up to P2-08. Each value can be between zero and the maximum frequency „f-max“ (P1-01). It has to be noted, that the minimum frequency “f-min” (P1-02) will not be undercut, even when the fixed frequency is set to a lower value than P1-02.

Example:

P1-02 (f-min) = 10 Hz

P2-01 (f-Fix1) = 5 Hz

When f-Fix1 is selected, the drive runs with 10 Hz!

PNU	Parameter	Name	Range	Default
5.1	P2-01	f-Fix1	0 ... f-max (P1-01)	5.0 Hz
5.2	P2-02	f-Fix2	0 ... f-max (P1-01)	10.0 Hz
5.3	P2-03	f-Fix3	0 ... f-max (P1-01)	25.0 Hz
5.4	P2-04	f-Fix4	0 ... f-max (P1-01)	50.0 Hz
5.5	P2-05	f-Fix5	0 ... f-max (P1-01)	5 Hz
5.6	P2-06	f-Fix6	0 ... f-max (P1-01)	5 Hz
5.7	P2-07	f-Fix7	0 ... f-max (P1-01)	5 Hz
5.8	P2-08	f-Fix8	0 ... f-max (P1-01)	5 Hz

3.2 Selecting the sense of rotation

When using a fixed frequency the sense of rotation is determined by the commands FWD (clockwise) and REV (counter clockwise) respectively DIR. A negative sign leads to an inversion.

Required sense of rotation	Commands for selection	Polarity of the fixed frequency
Clockwise rotation	FWD resp. START	+
Counter clockwise rotation	FWD resp. START	-
Clockwise rotation	REV resp. START + DIR	+
Counter clockwise rotation	REV resp. START + DIR	-

3.3 Selecting the fixed frequency

The fixed frequencies can be activated via commands at the control terminals or via a field bus. The selection is binary coded → for 8 fixed frequencies 3 Bits (B0 ... B2) are required. The predefined terminal configurations selected with P1-13 enable access to the fixed frequencies. In addition there is a possibility to define user specific configurations in Menu 9.

3.3.1 Selection with predefined terminal configurations (P1-13)

P1-12 = 0: Terminal control					
P1-13	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3 (Terminal 4)	DI4/AI1 (Terminal 6)	DI5/AI2 (Terminal 10)
0	user defined	user defined	user defined	user defined	user defined
1	START	DIR	Select AI1 REF / f-Fix	AI1 REF	Select f-Fix Bit0
2	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix Bit2
3	START	DIR	Select AI1 REF / f-Fix1	AI1 REF	AI2 Torque REF
4	START	DIR	Select AI1 REF / f-Fix1	AI1 REF	Select t-decl / t-dec2
5	START	DIR	Select AI1 REF / AI2 REF	AI1 REF	AI2 REF
6	START	DIR	Select AI1 REF / f-Fix1	AI1 REF	EXTFLT
7	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	EXTFLT
8	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select t-decl / t-dec2
9	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select AI1 REF / f-Fix
10	START	DIR	UP	DOWN	Select DIG REF / f-Fix1
11	FWD	REV	Select AI1 REF / f-Fix	AI1 REF	Select f-Fix Bit0
12	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix Bit2
13	FWD	REV	Select AI1 REF / f-Fix1	AI1 REF	AI2 Torque REF
14	FWD	REV	Select AI1 REF / f-Fix1	AI1 REF	Select t-decl / t-dec2
15	FWD	REV	Select AI1 REF / AI2 REF	AI1 REF	AI2 REF
16	FWD	REV	Select AI1 REF / f-Fix1	AI1 REF	EXTFLT
17	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	EXTFLT
18	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	Select t-decl / t-dec2
19	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	Select AI1 REF / f-Fix
20	FWD	REV	UP	DOWN	Select REF / f-Fix1
21	Pulse FWD (NO)	Pulse STOP (NC)	Pulse REV (NO)	AI1 REF	Select AI1 REF / f-Fix1

Inside the Application Note „I/O Configuration“ (AP040034EN) the configuration of the control terminals is described. The following commands are important for the selection of fixed frequencies (Values in brackets: parameter numbers for manual configuration by the user):

Abbreviation	Function
Select AI1 REF / f-Fix (P9-18)	Selection between the analog speed reference at analog input AI1 (terminal 6) and a fixed frequency. The fixed frequency itself is selected with the commands “Select f-Fix Bit0 ... 2”. Low = analog reference, High = Fixed frequency
Select AI1 REF / f-Fix1 (P9-18, P9-21, P9-22)	Selection between the analog speed reference at analog input AI1 (terminal 6) and the fixed frequency 1 (f-Fix1), set with P2-01. Low = analog reference, High = f-Fix1
Select BUS REF / f-Fix (P9-18, P9-19, P9-20, P9-21, P9-22)	Selection between references. Low = reference from a field bus or a master drive (P1-12 = 5), High = Fixed frequency. The fixed frequency itself is selected with the commands “Select f-Fix Bit0 ... 2”.
Select BUS REF / f-Fix1 (P9-18, P9-21, P9-22)	Selection between references. Low = reference from a field bus or a master drive (P1-12 = 5), High = f-Fix1, set with P2-01
Select DIG REF / f-Fix (P9-18, P9-19, P9-20, P9-21, P9-22)	Selection between a digital reference, set with a keypad or via the commands UP and DOWN and a fixed frequency. The fixed frequency itself is selected with the commands “Select f-Fix Bit0 ... 2”. Low = digital reference, High = fixed frequency
Select DIG REF / f-Fix1 (P9-18, P9-21, P9-22)	Selection between a digital reference, set with a keypad or via the commands UP and DOWN and f-Fix1, set with P2-01 Low = digital reference, High = f-Fix1

Abbreviation	Function																																				
Select f-Fix Bit 0 Select f-Fix Bit 1 Select f-Fix Bit 2 (P9-21, P9-22, P9-23)	Selection of the fixed frequency with digital commands. The fixed frequencies f-Fix1 ... f-Fix8 are defined with P2-01 ... P2-08. <table border="1" data-bbox="544 331 1390 667"> <thead> <tr> <th></th> <th>Bit 2</th> <th>Bit 1</th> <th>Bit 0</th> </tr> </thead> <tbody> <tr> <td>f-Fix1 (P2-01)</td> <td>Low</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>f-Fix2 (P2-02)</td> <td>Low</td> <td>Low</td> <td>High</td> </tr> <tr> <td>f-Fix3 (P2-03)</td> <td>Low</td> <td>High</td> <td>Low</td> </tr> <tr> <td>f-Fix4 (P2-04)</td> <td>Low</td> <td>High</td> <td>High</td> </tr> <tr> <td>f-Fix5 (P2-05)</td> <td>High</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>f-Fix6 (P2-06)</td> <td>High</td> <td>Low</td> <td>High</td> </tr> <tr> <td>f-Fix7 (P2-07)</td> <td>High</td> <td>High</td> <td>Low</td> </tr> <tr> <td>f-Fix8 (P2-08)</td> <td>High</td> <td>High</td> <td>High</td> </tr> </tbody> </table>		Bit 2	Bit 1	Bit 0	f-Fix1 (P2-01)	Low	Low	Low	f-Fix2 (P2-02)	Low	Low	High	f-Fix3 (P2-03)	Low	High	Low	f-Fix4 (P2-04)	Low	High	High	f-Fix5 (P2-05)	High	Low	Low	f-Fix6 (P2-06)	High	Low	High	f-Fix7 (P2-07)	High	High	Low	f-Fix8 (P2-08)	High	High	High
	Bit 2	Bit 1	Bit 0																																		
f-Fix1 (P2-01)	Low	Low	Low																																		
f-Fix2 (P2-02)	Low	Low	High																																		
f-Fix3 (P2-03)	Low	High	Low																																		
f-Fix4 (P2-04)	Low	High	High																																		
f-Fix5 (P2-05)	High	Low	Low																																		
f-Fix6 (P2-06)	High	Low	High																																		
f-Fix7 (P2-07)	High	High	Low																																		
f-Fix8 (P2-08)	High	High	High																																		
Select PID REF / f-Fix (P9-18, P9-19, P9-20, P9-21, P9-22)	Selection between references. Low = reference from the output of the PID controller, High = Fixed frequency. The fixed frequency itself is selected with the commands "Select f-Fix Bit0 ... 2".																																				
Select PID REF / f-Fix1 (P9-18, P9-21, P9-22)	Selection between references. Low = reference from the output of the PID controller, High = f-Fix1, set with P2-01																																				

3.3.2 Use of fixed frequencies in device functions

In certain situations, fixed frequencies are selected by a device function. Please take care, that there is no collision because of user specific settings.

Fixed frequency	Function
f-Fix7	Fixed frequency before starting (P6-11 > 0): When starting the drive it ramps to f-Fix7 and after a time, defined by P6-11, it proceeds to the required speed. In hoist mode (P2-18 = 8) the motor has to generate a torque, before the mechanical brake may be released. The torque is set with f-Fix7.
f-Fix8	When P2-30 and/or P2-33 = 5 or 7 (analog inputs with a signal 4 ... 20 mA) the drive ramps to f-Fix8, in case of wire break in the reference circuit. When using a digital reference, parameter P2-37 determines the starting speed. With the settings P2-37 = 3 or 7 the drive ramps to f-Fix8 when started. With the setting P5-06 = 3 the drive ramps to f-Fix8 in case of Modbus fault. Fixed frequency after stop (P6-12 > 0): After removing the Enable signal, the drive ramps to f-Fix8 and, after a time defined by P6-12, to standstill. In hoist mode (P2-18 = 8) the motor has still to generate torque when he has reached standstill, because of the delay when the mechanical brake is applied. The torque is set with f-Fix8.

3.3.3 User defined selection

It is possible to specify the selection of fixed frequencies by the user, not using the predefined terminal configurations with P1-13. Condition \rightarrow P1-13 = 0. The assignment of signals to terminals is done in Menu 9. The Parameters inside the table below are important for the selection of fixed frequencies. In addition also the other terminals, e.g. for enabling and the analog reference must be configured.

PNU	Parameter	Name	Range	Default
432.0	P9-21	f-Fix Select B0	0: OFF / Function not activated 1: Digital Input 1 (DI1 = terminal 2) 2: Digital Input 2 (DI2 = terminal 3) 3: Digital Input 3 (DI3 = terminal 4) 4: Digital Input 4 (DI4 = terminal 6) 5: Digital Input 5 (DI5 = terminal 10) 6: Digital Input 6 (DI6 = terminal 1 on DXA-EXT-3DI3RO) 7: Digital Input 7 (DI7 = terminal 2 on DXA-EXT-3DI3RO) 8: Digital Input 8 (DI8 = terminal 3 on DXA-EXT-3DI3RO) 9: Analog Output 1 (AO1 = terminal 8) 10: Analog Output 2 (AO2 = terminal 11) 11: Relay Output 1 (RO1 = terminals 14 / 15 / 16) 12: Relay Output 2 (RO2 = terminals 17 / 18) 13: Digital Output 3 (DO3 = terminal 5 / 6 on DXA-EXT-3DI3RO resp. terminal 1 / 2 on DXA-EXT-3RO) 14: Digital Output 4 (DO4 = terminals 3 / 4 on DXA-EXT-3RO) 15: Digital Output 5 (DO5 = terminals 5 / 6 on DXA-EXT-3RO) 16: ON / Function activated 17: User register 1 18: User register 2 19: User register 3 20: User register 4 21: User register 5 22: User register 6 23: User register 7 24: User register 8 25: User register 9	0
432.1	P9-22	f-Fix Select B1	see P9-21	0
432.2	P9-23	f-Fix Select B0	see P9-21	0

Selection of the fixed frequencies:

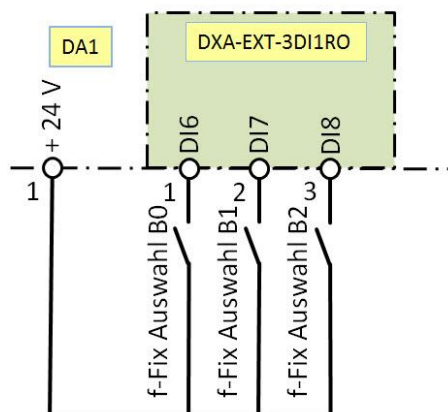
	f-fix Select B2	f-fix Select B1	f-fix Select B0
f-Fix1 (P2-01)	Low	Low	Low
f-Fix2 (P2-02)	Low	Low	High
f-Fix3 (P2-03)	Low	High	Low
f-Fix4 (P2-04)	Low	High	High
f-Fix5 (P2-05)	High	Low	Low
f-Fix6 (P2-06)	High	Low	High
f-Fix7 (P2-07)	High	High	Low
f-Fix8 (P2-08)	High	High	High

It is not necessary to use all 3 Bits in each case. If required, a selection can also be done with one (two fixed frequencies) or two (up to four fixed frequencies) commands.

3.3.4 Example: Eight fixed frequencies, user defined

NOTE: the assignments in this example only take these commands into account, which are necessary for the selection of fixed frequencies.

In this example more inputs than available on the basic device DA1 are needed. The option module DXA-EXT-3DI3RO is used to extend the number of inputs and outputs. There are three additional inputs at the terminals 1 (DI6), 2 (DI7) and 3 (DI8). These three inputs shall be used to select the eight fixed frequencies.



- P9-21 = 6 Input for „f-Fix Select B0“ is DI6 (terminal 1 on DXA-EXT-3DI1RO)
- P9-22 = 7 Input for „f-Fix Select B1“ is DI7 (terminal 2 on DXA-EXT-3DI1RO)
- P9-23 = 8 Input for „f-Fix Select B2“ is DI8 (terminal 3 on DXA-EXT-3DI1RO)

Selection of the fixed frequencies see table under 3.3.3

4 Set point setting with a frequency

Also a frequency signal can be used as speed reference.

- Activation: P6-08 > 0
- Connected to digital input DI3, signal common is 0 V (terminal 7 or 9).

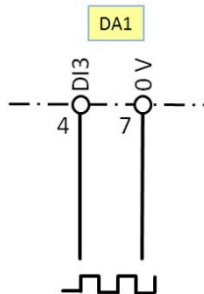
The signal has to fulfill the following conditions:

- Square wave signal, one channel
- High-Level 10 ... 24 V
- Minimum time between two pulses: 28 μ s
- Frequency at maximum speed (P1-01): 5 ... 20 kHz

When using a frequency signal as speed reference, the following settings have to be done:

- P6-08 „Freq RefMax“: frequency, which corresponds to the maximum speed (P1-01). It is entered in kHz (integer) in the range between 5 and 20 kHz.
- P1-13 = 0 \rightarrow user defined terminal configuration. The definition of the terminal functions has to be done in Menu 9.
- „SpeedSource1“ (P9-10) = 8 „Frequency reference“. The signal at digital input DI3 is then interpreted as speed reference.

The selection of the sense of rotation is carried out with the commands FWD and REV respectively DIR.



Hint:

By setting P1-13 to 0, all terminal assignments, e.g. FWD, REV, Reset ..., are cancelled and must therefore be configured manually. When using the parameter software DrivesConnect, all values different from the default settings are marked in blue. Also the default values are stated. This simplifies the new setting in case only a new Source for the speed reference has to be chosen.

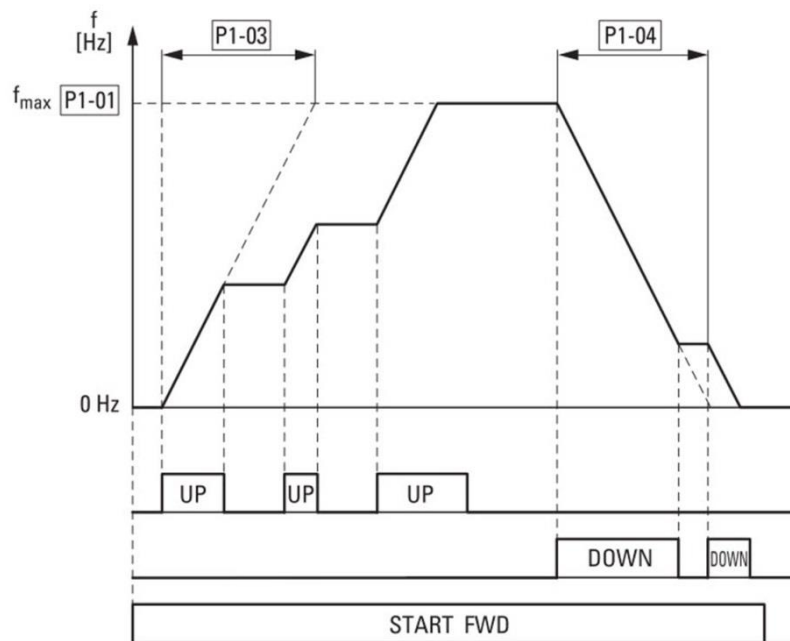
PNU	Parameter	Name	Range	Default
34.0	P6-08	Freq RefMax	0, 5, 6, 7, ... 19, 20 kHz	0

5 Digital reference

The speed reference of the variable frequency drives DA1 can also be given via digital commands. The command UP (faster) increases the content of the reference counter, while DOWN (slower) reduces it. The use of a digital reference has the advantage, that the reference can be set from different locations by paralleling push buttons, which is required in cases of large machines.

The setting occurs between the minimum speed / frequency (f_{\min} , P1-02) and the maximum frequency / speed with the actual ramp. The setting can be done with the keypad as well as via terminals.

Example:



- When an enabled drive gets the “UP” command, the motor accelerates according to the actual ramp (in this example: t_{acc} (P1-03))
- When the „UP“ command is removed, the speed remains constant. Applying “UP” again leads to a further acceleration. The maximum frequency / speed is defined with “ f_{\max} ” (P1-01).
- Consequently, applying „DOWN“ leads to a speed reduction.
- In case a minimum frequency / speed is set with „ f_{\min} “ (P1-02), the motor accelerates to this speed as soon as the drive is enabled without any “UP” command. “ f_{\min} ” is also the minimum speed in case of speed reduction.

5.1 Configuration

5.1.1 Terminals / Keypad

The possibility, where to modify the digital reference, is determined by P1-12:

UP / DOWN via terminals only (with P1-13 = 10 or 20)	P1-12 = 0 / 10
UP / DOWN via keypad and possibly via terminals in case P1-13 = 10 or 20. No reversing by using the keypad possible.	P1-12 = 1
UP / DOWN via keypad and possibly via terminals in case P1-13 = 10 or 20. Reversing by using the keypad is possible.	P1-12 = 2

With all other settings of P1-12 operation with a digital reference is not possible.

P1-12 = 0: Terminal control					
P1-13	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3 (Terminal 4)	DI4/AI1 (Terminal 6)	DI5/AI2 (Terminal 10)
0	user defined	user defined	user defined	user defined	user defined
1	START	DIR	Select AI1 REF / f-Fix	AI1 REF	Select f-Fix Bit0
2	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix Bit2
3	START	DIR	Select AI1 REF / f-Fix1	AI1 REF	AI2 Torque REF
4	START	DIR	Select AI1 REF / f-Fix1	AI1 REF	Select t-dec1 / t-dec2
5	START	DIR	Select AI1 REF / AI2 REF	AI1 REF	AI2 REF
6	START	DIR	Select AI1 REF / f-Fix1	AI1 REF	EXTFLT
7	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	EXTFLT
8	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select t-dec1 / t-dec2
9	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select AI1 REF / f-Fix
10	START	DIR	UP	DOWN	Select DIG REF / f-Fix1
11	FWD	REV	Select AI1 REF / f-Fix	AI1 REF	Select f-Fix Bit0
12	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix Bit2
13	FWD	REV	Select AI1 REF / f-Fix1	AI1 REF	AI2 Torque REF
14	FWD	REV	Select AI1 REF / f-Fix1	AI1 REF	Select t-dec1 / t-dec2
15	FWD	REV	Select AI1 REF / AI2 REF	AI1 REF	AI2 REF
16	FWD	REV	Select AI1 REF / f-Fix1	AI1 REF	EXTFLT
17	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	EXTFLT
18	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	Select t-dec1 / t-dec2
19	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1	Select AI1 REF / f-Fix
20	FWD	REV	UP	DOWN	Select REF / f-Fix1
21	Pulse FWD (NO)	Pulse STOP (NC)	Pulse REV (NO)	AI1 REF	Select AI1 REF / f-Fix1

P1-12 = 1 or 2: digital reference					
P1-13	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3 (Terminal 4)	DI4/AI1 (Terminal 6)	DI5/AI2 (Terminal 10)
0	user defined	user defined	user defined	user defined	user defined
1	START	DIR	Select DIG REF / f-Fix	without function	Select f-Fix Bit0
2	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix Bit2
3	START	DIR	Select DIG REF / f-Fix1	without function	without function
4	START	DIR	Select DIG REF / f-Fix1	without function	Select t-dec1 / t-dec2
5	START	DIR	Select DIG REF / AI2 REF	without function	AI2 REF
6	START	DIR	Select DIG REF / f-Fix1	without function	EXTFLT
7	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	EXTFLT
8	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select t-dec1 / t-dec2
9	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1	Select DIG REF / f-Fix
10	START	DIR	UP	DOWN	Select DIG REF / f-Fix1
11	Select Quick-dec		Select DIG REF / f-Fix	without function	Select f-Fix Bit0
12	Select Quick-dec		Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix Bit2
13	Select Quick-dec		Select DIG REF / f-Fix1	without function	without function
14	Select Quick-dec		Select DIG REF / f-Fix1	without function	Select t-dec1 / t-dec2
15	Select Quick-dec		Select DIG REF / AI2 REF	without function	AI2 REF
16	Select Quick-dec		Select DIG REF / f-Fix1	without function	EXTFLT
17	Select Quick-dec		Select f-Fix Bit0	Select f-Fix Bit1	EXTFLT
18	Select Quick-dec		Select f-Fix Bit0	Select f-Fix Bit1	Select t-dec1 / t-dec2
19	Select Quick-dec		Select f-Fix Bit0	Select f-Fix Bit1	Select DIG REF / f-Fix
20	Select Quick-dec		UP	DOWN	Select DIG REF / f-Fix1
21			not allowed		

Note:

The functions assigned to DI1 (terminal 2) and DI2 (terminal 3) depend on the setting of P2-37 „Digital Reference Reset Mode“ in case P1-13 = 11 ... 20 (see 5.1.2).

	DI1	DI2
P2-37 = 0...7, P1-13 = 1 ... 10	START	INV
P2-37 = 0...3, P1-13 = 11 ... 20	Select Quick-dec	
P2-37 = 4...7, P1-13 = 11 ... 20	FWD	REV

5.1.1.1 User defined terminal configuration

In case of a user defined terminal configuration, the source for the commands UP and DOWN are determined by P9-28 and P9-29.

- Low → no increase / reduction of the digital reference
 High → the reference will be increased / reduced

PNU	Parameter	Name	Range	Default
421.4	P9-28	DigRef UP Source	0: OFF / Function not activated 1: Digital Input 1 (DI1 = terminal 2) 2: Digital Input 2 (DI2 = terminal 3) 3: Digital Input 3 (DI3 = terminal 4) 4: Digital Input 4 (DI4 = terminal 6) 5: Digital Input 5 (DI5 = terminal 10) 6: Digital Input 6 (DI6 = terminal 1 on DXA-EXT-3DI3RO) 7: Digital Input 7 (DI7 = terminal 2 on DXA-EXT-3DI3RO) 8: Digital Input 8 (DI8 = terminal 3 on DXA-EXT-3DI3RO) 9: Analog Output 1 (AO1 = terminal 8) 10: Analog Output 2 (AO2 = terminal 11) 11: Relay Output 1 (RO1 = terminals 14 / 15 / 16) 12: Relay Output 2 (RO2 = terminals 17 / 18) 13: Digital Output 3 (DO3 = terminal 5 / 6 on DXA-EXT-3DI3RO resp. terminal 1 / 2 on DXA-EXT-3RO) 14: Digital Output 4 (DO4 = terminals 3 / 4 on DXA-EXT-3RO) 15: Digital Output 5 (DO5 = terminals 5 / 6 on DXA-EXT-3RO) 16: ON / Function activated 17: User register 1 18: User register 2 19: User register 3 20: User register 4 21: User register 5 22: User register 6 23: User register 7 24: User register 8 25: User register 9	0
421.5	P9-29	DigRef DWN Source	see P9-28	0

5.1.2 Reference at start and at changeover between speed sources

When starting a drive with a digital reference and when changing over from another speed source, e.g. a fixed frequency, to a digital reference the reference value to be ramped to is determined by the setting of P2-37 “Digital Reference Reset Mode”:

- P2-37 = 0 or 4
 - Minimum speed
 - Example 1: Behavior at start
 - Drive runs with digital reference → switch OFF → restart → drive ramps to the minimum speed, set with P1-02 „f-min“.
 - Example 2: Behavior at changeover between speed sources
 - Drive runs with digital reference → Changeover to another speed source by applying a signal to the terminal → drive ramps to the speed required by the other speed source → Select “Digital reference” by removing the signal from the terminal → drive ramps to the minimum speed, set with P1-02 „f-min“.
- P2-37 = 1 or 5
 - Start with the latest speed before switching OFF or changing over to another speed source, set with the keypad or with the commands UP and DOWN at the terminals. This also applies to cases where another speed source was active at the time of switching OFF, but which is not selected at restart.
 - Example: The digital reference was set with the keypad to 1000 rpm. The speed source was changed from “Digital reference” to „Fixed Frequency 1” by means of a command at the control terminals. The drive is switched OFF when “Fixed Frequency1” is active.
 - Select „Digital reference“ at the terminals → drive ramps to the 1000 rpm set with the keypad
 - „Fixed Frequency 1“ was selected at the terminal when restarting → Drive ramps to Fixed Frequency 1
 - Changeover to “Digital reference” with the signal at the terminals → drive ramps to 1000 rpm
- P2-37 = 2 or 6
 - Start with the speed before switching OFF / changing over. This setting is mostly used in cases where a changeover between speed sources, e.g. between a digital reference and a fixed frequency, is required.
 - Example 1: Changeover between a digital reference and another speed source
 - Drive runs with digital reference → Changeover → drive ramps to the speed of the other speed source → back to digital reference → drive runs with the speed of the previous speed source, which was selected before changing over. The speed can now be changed with the keys on the keypad or with the signals UP and DOWN at the control terminals. ATTENTION: In case a fixed frequency is used as speed source, it may have no negative sign!
 - Example 2: Switching OFF when a digital reference is active and restart
 - Drive ramps to the minimum speed, set with P1-02 „f-min“.

- Example 3: Switching OFF when another speed source is active
 - Selection of another speed source is still active at restart: drive ramps to the speed provided by the other speed source
 - Selection of another speed source not active at restart: Drive ramps to the minimum speed, set with P1-02 „f-min“.
- P2-37 = 3 or 7
 - Fixed Frequency 8 (P2-08)
 - Note: At start the sense of rotation is ALWAYS determined by the commands at the terminals. A possible negative sign of the fixed frequency value is not taken into account!

P2-37 „Digital Reference Reset Mode“ also determines, how the drive can be started when P1-12 = 1 or 2:

- P2-37 = 0...3
 - Starting of the drive by pushing the green START button on the keypad.
 - P1-13 = 1 ... 10: in addition a signal at the control terminals is necessary to start the drive.
 - P1-13 = 11 ... 20 an additional signal at the terminals is not necessary.
 - Condition in both cases: the STO signal (Safe Torque OFF) at the terminals 12 and 13 is applied.
- P2-37 = 4...7
 - The start of the drive is carried out via the terminals (see also 5.1.1). A start with the button on the keypad is not possible. Condition: the STO signal (Safe Torque OFF) at the terminals 12 and 13 is applied.
 - Note: With P1-12 = 2 it is still possible to reverse the drive by pushing the green button on the keypad.

PNU	Parameter	Name	Range	Default
620.3	P2-37	Digital Reference Reset Mode	0 ... 3: START via keypad 0: Minimum speed (P1-02) 1: Previous speed from Keypad / terminals (UP/DOWN) 2: Running speed before switching OFF / changing over 3: f-Fix8 (P2-08) 4 ... 7: START via terminals 4: Minimum speed (P1-02) 5: Previous speed from Keypad / terminals (UP/DOWN) 6: Running speed before switching OFF / changing over 7: f-Fix8 (P2-08)	1

5.2 Operation

5.2.1 Starting / Stopping

Drives, which operate with a digital reference, can be started via terminals as well as via keypad. The possibilities depend on the setting of the parameters P1-12 “Local ProcessData Source”, P1-13 “DI Config Select” and P2-37 “Digital Reference Reset Mode”.

Note:

It can also be selected, that a signal from the terminal as well as one from the keypad must be applied to start the drive. In this case the signal at the terminal must be present before the button on the keypad is pushed.

P1-12	P2-37	P1-13	Starting via terminal only	Starting via keypad only	Starting via terminal AND keypad
P1-12 = 0	P2-37 = 0...7	P1-13 = 10 / 20	YES	NO	NO
P1-12 = 1 / 2	P2-37 = 0...3	P1-13 = 1...10	NO	NO	YES
		P1-13 = 11 ... 20	NO	YES	NO
	P2-37 = 4...7	P1-13 = 1 ... 20	YES*	NO	NO

*In this case the keypad cannot be used to start the drive, but with P1-12 = 2 the green button can still be used to reverse it (see 5.2.3).

5.2.2 Increase / reduce speed

When using a digital reference the speed is changed via the commands UP and DOWN. For the duration of the commands the speed is increased respectively reduced. The commands are given via the keypad or via terminals (with P1-13 = 10 or 20). The actual digital reference can be displayed with P0-06 „MotorPot Reference“.

The behavior of the drive is depending on keypad or terminal adjustment. While a command via terminals modifies the speed with the actual ramp directly, an adjustment with the keypad has a slope and works more smoothly. This results in a delay of about 1.5 s for every actuation.

An increase / reduction of the digital reference is possible

- by setting P1-12 to 1 or 2 (digital reference)
- with P1-12 = 0 (terminal mode) with the settings P1-13 = 10 or 20

In both cases the commands at the terminals (with P1-13 = 10 or 20) as well as the ones at the keypad are active.

Note:

- Simultaneous use of UP and DOWN (both via terminals or both via keypad) reduces the speed.
- The terminal command dominates the one from the keypad. This also means: DOWN via keypad and UP via terminal → the speed increases.
- A speed adjustment via keypad is also possible in cases where starting and stopping via keypad is disabled.

5.2.3 Change sense of rotation

The sense of rotation at start with a digital reference is basically determined by the terminal commands. With P12 = 2 one has the possibility to reverse the motor by pressing the green Start button on the keypad. Behavior at start: see column "Sense of rotation at START" in the table below.

P1-12	P2-37	P1-13	Sense of rotation via terminal	Sense of rotation via keypad	Sense of rotation at START
P1-12 = 0	P2-37 = 0...7	P1-13 = 10	YES (DIR)	NO	Sense of rotation as selected via terminals
		P1-13 = 20	YES (FWD / REV)	NO	
P-12 = 1	P2-37 = 0...7	P1-13 = 1...10	YES (DIR)	NO	No change of sense of rotation possible
		P1-13 = 11...20	NO	NO	
P1-12 = 2	P2-37 = 0, 2, 3	1...10	YES (DIR)	YES (INV)	Sense of rotation as selected via terminals
	P2-37 = 4, 6, 7	1...10	YES (DIR)	YES (INV)	
	P2-37 = 0, 2, 3	11...20	NO	YES (INV)	
	P2-37 = 4, 6, 7	11...20	NO	YES (INV)	
	P2-37 = 1	1...10	YES (DIR)	YES (INV)	Sense of rotation as selected via terminals, taking into account a possible inversion at the time of stopping the drive (Start button on the keypad).
	P2-37 = 5	1...10	YES (DIR)	YES (INV)	
	P2-37 = 1	11...20	NO	YES (INV)	
	P2-37 = 5	11...20	NO	YES (INV)	

Note:

- Applying the FWD and REV commands simultaneously leads to a Quickstop with the ramp set with P2-25 „t-QuickDec“.
- In applications with reversion, the Stop Mode should be set in a way, that the ramp is active (P1-05 = 0 or 2). If this is not the case and P1-13 = 11 ... 20 a changeover between the commands FWD and REV is detected as stop command and the drive behaves according the setting with P1-05. After this, it restarts into the opposite direction. If, application dependent, P1-05 is set to "coast to stop" (setting 1 respectively 3), spin start has to be enabled with P2-26 = 1.
- With the settings P2-37 = 1 or 4 a possible inversion with the Start button on the keypad is stored at stop. The drive restarts with the same sense of rotation he had before stopping. Please note, that in this case the sense of rotation at restart cannot be clearly defined by the terminal commands.

6 User defined configuration

Variable frequency drives of the series DA1 can be adopted to the requirements of the application in a flexible way. Three different level of configuration exist:

- Using default settings
- Selection out of predefined sets, e.g. for terminal configuration
- Free configuration of the device with the parameters of Menu 9. Please note: In this case ALL necessary functions have to be assigned to terminals. The predefined terminal configuration sets of P1-13 cannot be used. To use the parameters of Menu 9 (P9-...), P1-13 = 0 (user defined) must be selected.

6.1 Speed sources

It is possible to define up to 8 speed sources with P9-10 ... P9-17 and to select them during operations with P9-18 ... P9-20. A changeover between speed sources is effective directly. A transition to the new reference value is performed with the actual ramp. It is not necessary to start and stop the drive when changing over between different speed sources.

6.1.1 Possible speed sources

PNU	Parameter	Name	Range	Default
430.0	P9-10	SpeedSource1	0: Analog input 1 as speed reference 1: Analog input 2 as speed reference 2: Preset fixed frequency (selected with P9-21 ... P9-23) 3: Digital reference (keypad) 4: PID controller output 5: Master speed 6: Speed reference via fieldbus 7: Reference from function block 8: Frequency reference (see P6-08) 9: Preset fixed frequency f-fix1 (P2-01) 10: Preset fixed frequency f-fix2 (P2-02) 11: Preset fixed frequency f-fix3 (P2-03) 12: Preset fixed frequency f-fix4 (P2-04) 13: Preset fixed frequency f-fix5 (P2-05) 14: Preset fixed frequency f-fix6 (P2-06) 15: Preset fixed frequency f-fix7 (P2-07) 16: Preset fixed frequency f-fix8 (P2-08)	0
430.1	P9-11	SpeedSource2	see P9-10	0
430.2	P9-12	SpeedSource3	see P9-10	0
430.3	P9-13	SpeedSource4	see P9-10	0
430.4	P9-14	SpeedSource5	see P9-10	0
430.5	P9-15	SpeedSource6	see P9-10	0
430.6	P9-16	SpeedSource7	see P9-10	0
430.7	P9-17	SpeedSource8	see P9-10	0

6.1.2 Selecting the speed source

The parameters inside the table are important to select the speed source via terminals. In addition also the other terminals e.g. for the enable signal or the reference value have to be configured.

PNU	Parameter	Name	Range	Default
431.0	P9-18	Speed Select B0	0: OFF / Function not activated 1: Digital Input 1 (DI1 = terminal 2) 2: Digital Input 2 (DI2 = terminal 3) 3: Digital Input 3 (DI3 = terminal 4) 4: Digital Input 4 (DI4 = terminal 6) 5: Digital Input 5 (DI5 = terminal 10) 6: Digital Input 6 (DI6 = terminal 1 on DXA-EXT-3DI3RO) 7: Digital Input 7 (DI7 = terminal 2 on DXA-EXT-3DI3RO) 8: Digital Input 8 (DI8 = terminal 3 on DXA-EXT-3DI3RO) 9: Analog Output 1 (AO1 = terminal 8) 10: Analog Output 2 (AO2 = terminal 11) 11: Relay Output 1 (RO1 = terminals 14 / 15 / 16) 12: Relay Output 2 (RO2 = terminals 17 / 18) 13: Digital Output 3 (DO3 = terminal 5 / 6 on DXA-EXT-3DI3RO resp. terminal 1 / 2 on DXA-EXT-3RO) 14: Digital Output 4 (DO4 = terminals 3 / 4 on DXA-EXT-3RO) 15: Digital Output 5 (DO5 = terminals 5 / 6 on DXA-EXT-3RO) 16: ON / Function activated 17: User register 1 18: User register 2 19: User register 3 20: User register 4 21: User register 5 22: User register 6 23: User register 7 24: User register 8 25: User register 9	0
431.1	P9-19	Speed Select B1	see P9-18	0
431.2	P9-20	Speed Select B2	see P9-18	0

Selection of the speed source:

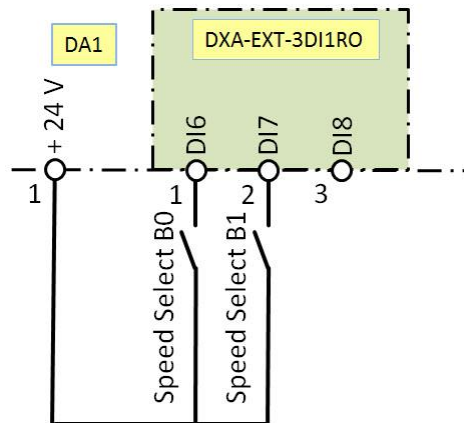
	Speed Select B2	Speed Select B1	Speed Select B0
SpeedSource1 (P9-10)	Low	Low	Low
SpeedSource2 (P9-11)	Low	Low	High
SpeedSource3 (P9-12)	Low	High	Low
SpeedSource4 (P9-13)	Low	High	High
SpeedSource5 (P9-14)	High	Low	Low
SpeedSource6 (P9-15)	High	Low	High
SpeedSource7 (P9-16)	High	High	Low
SpeedSource8 (P9-17)	High	High	High

It is not necessary to use all three bits in each case. If required, a selection can also be done with 1 Bit (2 speed sources) or 2 Bits (up to 4 speed sources).

6.1.3 Example: four speed sources, user defined

Note: the terminal configuration below only takes those commands into account, which are necessary for the selection of the speed source.

In this example more inputs than the ones available on the basic device DA1 are needed. The I/O extension module DXA-EXT-3DI1RO is used, which has three additional inputs at the terminals 1 (DI6), 2 (DI7) and 3 (DI8). Two of these inputs should be used to select the four speed sources.



- P9-18 = 6 Input for „Speed Select B0“ is DI6 (terminal 1 on DXA-EXT-3DI1RO)
- P9-19 = 7 Input for „Speed Select B1“ is DI7 (terminal 2 on DXA-EXT-3DI1RO)

Selection of the speed source see table under 6.1.2

6.1.4 Starting, Stopping, Sense of rotation

In a user defined configuration the source for the selection of the sense of rotation has to be determined

Following functions related to the selection of the sense of rotation are available in Menu 9:

„Enable Operation Source“ (P9-01)

This signal is usually assigned to Digital Input 1. It is e.g. used in applications, where the START signal comes via fieldbus or from a function block. This signal (logic = 1) is necessary to operate the drive. At removal (logic = 0) the drive stops with the ramp selected by P9-26 / P9-27.

„QuickStop Source“ (P9-02)

This signal (logic = 1) is necessary to operate the drive. At removal (logic = 0) the drive stops with the ramp selected by P2-25).

„FWD Source“ (P9-03)

This signal (logic = 1) is necessary to operate the drive in the clockwise sense of rotation. At removal (logic = 0) the drive stops with the ramp selected by P9-26 / P9-27. When FWD and REV command are applied simultaneously, the drive executes a Quick Stop. The source, selected here, can also be configured for a control with a latch signal. Description see P9-05.

„REV Source“ (P9-04)

This signal (logic = 1) is necessary to operate the drive in the counter clockwise sense of rotation. At removal (logic = 0) the drive stops with the ramp selected by P9-26 / P9-27. When FWD and REV command are applied simultaneously, the drive executes a Quick Stop. The source, selected here, can also be configured for a control with a latch signal. Description see P9-05.

„Signal Format“ (P9-05)

0: OFF. The commands for clockwise (FWD) and counter clockwise (REV) sense of rotation have to be applied constantly.

1: Latch control ON. The drive can be started, stopped and reversed by means of pulses.

Function:

P9-01 (Enable): This signal has to be applied constantly during run. Removing the signal for a short time leads to a stop of the drive. For a restart a signal at the source, defined with P9-03 or P9-04, is necessary.

P9-03 (FWD): Start of the drive (direction: clockwise) via a pulse at the source defined here. To stop the removing of the enable signal is necessary.

P9-04 (REV): Start of the drive (direction: counter clockwise) via a pulse at the source defined here. To stop the removing of the enable signal is necessary.

„Force REV Source“ (P9-06)

This signal (logic = 1) forces the drive to run in the counter clockwise direction. It is irrelevant, if the FWD or the REV command is applied. Without this signal (logic = 0) the sense of rotation is determined by FWD and REV commands.

„EnableDirFWD Source“ (P9-30)

Defines a source for a signal to enable the "clockwise" (FWD) sense of rotation.

Logic 0 = An operation in clockwise direction is not possible. If the motor already turns in clockwise direction when the signal changes from logic 1 to 0, it ramps to stand still by using the quick stop ramp (P2-25)

Logic 1 = An operation in clockwise direction is possible.

„EnableDirREV Source“ (P9-31)

Defines a source for a signal to enable the "counter clockwise" (REV) sense of rotation.

Logic 0 = An operation in counter clockwise direction is not possible. If the motor already turns in counter clockwise direction when the signal changes from logic 1 to 0, it ramps to stand still by using the quick stop ramp (P2-25)

Logic 1 = An operation in counter clockwise direction is possible.

PNU	Parameter	Name	Range	Default
400.3	P9-01	Enable Operation Source	0: STO (Terminals 12 / 13) 1: Digital Input 1 (DI1 = Terminal 2) 2: Digital Input 2 (DI2 = Terminal 3) 3: Digital Input 3 (DI3 = Terminal 4) 4: Digital Input 4 (DI4 = Terminal 10) 5: Digital Input 5 (DI5 = Terminal 6) 6: Digital Input 6 (DI6 = Terminal 1 on DXA-EXT-3DI1RO) 7: Digital Input 7 (DI7 = Terminal 2 on DXA-EXT-3DI1RO) 8: Digital Input 8 (DI8 = Terminal 3 on DXA-EXT-3DI1RO)	0
400.2	P9-02	QuickStop Source	0: OFF / Function not activated 1: Digital Input 1 (DI1 = terminal 2) 2: Digital Input 2 (DI2 = terminal 3) 3: Digital Input 3 (DI3 = terminal 4) 4: Digital Input 4 (DI4 = terminal 6) 5: Digital Input 5 (DI5 = terminal 10) 6: Digital Input 6 (DI6 = terminal 1 on DXA-EXT-3DI3RO) 7: Digital Input 7 (DI7 = terminal 2 on DXA-EXT-3DI3RO) 8: Digital Input 8 (DI8 = terminal 3 on DXA-EXT-3DI3RO) 9: Analog Output 1 (AO1 = terminal 8) 10: Analog Output 2 (AO2 = terminal 11) 11: Relay Output 1 (RO1 = terminals 14 / 15 / 16) 12: Relay Output 2 (RO2 = terminals 17 / 18) 13: Digital Output 3 (DO3 = terminal 5 / 6 on DXA-EXT-3DI3RO resp. terminal 1 / 2 on DXA-EXT-3RO) 14: Digital Output 4 (DO4 = terminals 3 / 4 on DXA-EXT-3RO) 15: Digital Output 5 (DO5 = terminals 5 / 6 on DXA-EXT-3RO) 16: ON / Function activated 17: User register 1 18: User register 2 19: User register 3 20: User register 4 21: User register 5 22: User register 6 23: User register 7 24: User register 8 25: User register 9	0
421.0	P9-03	FWD Source	see P9-02	1
421.1	P9-04	REV Source	see P9-02	2
422.0	P9-05	Signal Format	0: Latch control OFF 1: Latch control ON	0
421.8	P9-06	Force REV Source	see P9-01	0
421.6	P9-30	EnableDirFWD Source	see P9-01	0
421.7	P9-31	EnableDirREV Source	see P9-01	0