Van der Ende Group

COURSE

Danfoss Vacon® 100 FLOW

Version: 26.17F
Sw: FW0159V030
Date: January 2026

INDEX

PREFACE

This course book is issued to those who have followed the Vacon 100 Flow course at Van der Ende Group. It is also issued with each Vacon 100 Flow regulator.

The course book is also intended as a quick and handy instruction manual for commissioning the Vacon 100 Flow. This textbook also shows a few sample applications.
We therefore emphatically recommend that the original instruction manuals provided with the regulator are always read very carefully.

No rights can be derived from the information provided in this course book.
Errors and/or typographical errors that could result in incorrect settings and/or damage to the regulator or connected equipment may never give rise to warranty or damage claims, and are hereby expressly rejected.

The parameters listed in this booklet are merely examples from which no rights can be derived.

In this new version, a number of parameters have been changed or added compared to the previous version.

1 SAFETY

ONLY QUALIFIED TECHNICIANS MAY CARRY OUT WORK ON THE ELECTRICAL INSTALLATION

WARNING	1	The components of the power unit of the frequency converter are live when the Vacon 100 is connected to the mains. Contact with this live voltage is extremely dangerous, and can result in serious injuries or death. The control unit is potential-free.
	2	The Vacon 100 has a leakage current of 3.5 mA AC according to EN61800-5-1.
	3	If the frequency converter is part of a machine, the machine manufacturer is responsible for installing a main switch for the machine (EN 60204-1).
	4	Only spare parts supplied by Vacon may be used.
	5	The motor cables must be disconnected from the frequency converter before insulation and other measurements are carried out on the motor or motor cables.
	6	Do not touch the IC-circuits on the boards. Static voltage can damage the components.
	7	Check that the EMC level of the frequency converter corresponds to the required value as determined by the environment.
	8	The motor starts automatically if you set the parameter setting (ID 731) 'reaction after an error message' to automatic. Read more about this in the application manual.
	9	The Vacon 100 frequency converter must be used for permanent installations.
	10	Be aware that the frequency converter can start automatically when it is connected to the power supply. To prevent this, unplug the motor from the frequency converter if sudden starting might be hazardous.

	1	The U, V, and W motor terminals and the DC rail / brake resistor -/+ terminals are live when the Vacon 100 is connected to the mains, even if the motor is not running.
	2	The I/O connectors for the controllers are electrically isolated from the mains. However, even when the Vacon 100 is disconnected from the mains, the relay outputs and other I/O terminals may have a dangerous external voltage.
	3	Before the frequency converter is connected to the mains, make sure that the Vacon 100 covers and cable connections are covered.
	4	Do not carry out any measurements when the frequency converter is connected to the mains.
	5	After disconnecting the frequency converter from the mains, wait until the fan stops and the control panel turns off (if no panel is attached, see the indicators on the cover). **Wait 5 minutes** before performing any work on the Vacon 100 terminals. Do not even open the cover before this time has passed.
	6	Do not perform any insulation resistance tests on the Vacon 100. There is a specific procedure for carrying out such tests. Failure to follow this procedure may cause damage to the device.

Safety instructions
Earthing and earth error protection
The Vacon 100 frequency converter must always be earthed on the earth terminal 

2 WIRING AND DISPLAY

2.1 Cable diameter and fuses

Frame	Type	I_L [A]	Fuse (gG/gL) [A]	Mains and motor cable Cu [mm²]	Terminal size	
					Mains connection [mm²]	Earth connection [mm²]
MR4	0003 4 - 0004 4	3.4 to 4.8	6	3 x 1.5 + 1.5	1 to 6 solid 1 to 4 flexible	1 to 6
	0005 4 -0008 4	5.6 to 8.0	10	3 x 1.5 + 1.5	1 to 6 solid 1 to 4 flexible	1 to 6
	0009 4 -0012 4	9.6 to 12.0	16	3 x 1.5 + 1.5	1 to 6 solid 1 to 4 flexible	1 to 6
MR5	0016 4	16.0	20	3 x 6 + 6	1 to 10 Cu	1 to 10
	0023 4	23.0	25	3 x 6 + 6	1 to 10 Cu	1 to 10
	0031 4	31.0	32	3 x 10 + 10	1 to 10 Cu	1 to 10
MR6	0038 4	38.0	40	3 x 10 + 10	2.5 to 50 Cu/Al	2.5 to 35
	0046 4	46.0	50	3 x 16 + 16 (Cu) 3 x 25 + 16 (Al)	2.5 to 50 Cu/Al	2.5 to 35
	0061 4	61.0	63	3 x 25 + 16 (Cu) 3 x 35 + 10 (Al)	2.5 to 50 Cu/Al	2.5 to 35
MR7	0072 4	72.0	80	3 x 35 + 16 (Cu) 3 x 50 + 16 (Al)	6 to 70 Cu/Al	6 to 70
	0087 4	87.0	100	3 x 35 + 16 (Cu) 3 x 70 + 21 (Al)	6 to 70 Cu/Al	6 to 70
	0105 4	105.0	125	3 x 50 + 25 (Cu) 3 x 70 + 21 (Al)	6 to 70 Cu/Al	6 to 70
MR8	0140 4	140.0	160	3 x 70 + 35 (Cu) 3 x 95 + 29 (Al)	Bolt size M8	Bolt size M8
	0170 4	170.0	200	3 x 95 + 50 (Cu) 3 x 150 + 41 (Al)	Bolt size M8	Bolt size M8
	0205 4	205.0	250	3 x 120 + 70 (Cu) 3 x 185 + 57 (Al)	Bolt size M8	Bolt size M8
MR9	0261 4	261.0	315	3 x 185 + 95 (Cu) 2 x 3 x 120 + 41 (Al)	Bolt size M8	Bolt size M8
	0310 4	310.0	350	2 x 3 x 95 +50 (Cu) 2 x 3 x 120 + 41 (Al)	Bolt size M8	Bolt size M8

2.2 Shielded cables

The cables of the control signals and of the motor must be shielded in order to meet radio interference rules, in accordance with IEC 60364-5-52 and EMC specifications.
The shielding of the motor and control cables must be connected to the earth terminal in the frequency converter and in the motor and sensors, PLC etc.
If unshielded cables are used, signal interference can occur in the control inputs. Such interference will not normally damage the frequency converter, but will interfere with regulation.

Max. length of motor cable	**MR4**	**MR5 and MR6**	**MR7, MR8 and MR9**
	100 m	150 m	200 m

Be careful! Reinforcement designed as mechanical protection (e.g. earth cable) is not suitable for an EMC-correct installation.

Our preference is to use twisted cable for signal cables.

2.3 Control keys

Back/Reset
This key returns you to the menu. You can also use this key to end an entry without it being stored. If a problem has been resolved, the frequency converter can be reset by holding this key for a few seconds.

Funct
The funct key can be used anywhere in the programme to switch from Local (keypad) to Remote (I/O or fieldbus) operation. The operation page can also be selected.

OK
This key allows you to enter a folder or parameter. It also confirms a change to a parameter (stored in EPROM).

Menu key up
Use this key to scroll up through main menus and sub-menus, or change the value in a parameter.

Menu key down
Use this key to scroll down through main menus and sub-menus, or change the value in a parameter.

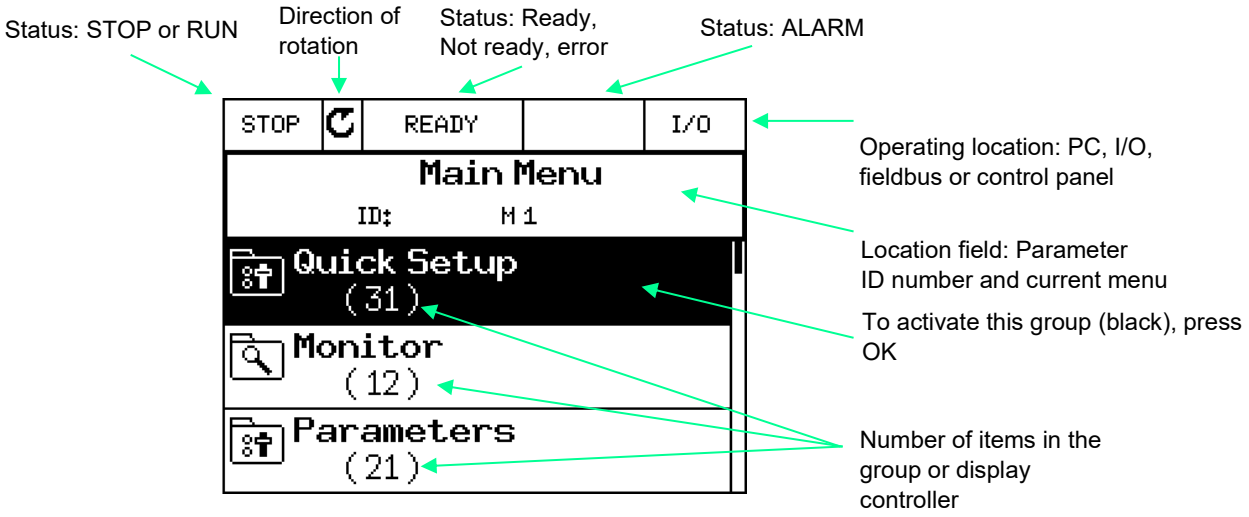
Menu key left
This key can be used when changing each digit of a parameter.

Menu key right
This key can be used when changing each digit of a parameter.
If the parameter is selected, you can change the parameter immediately by holding down this key.

Start
This key starts the motor when in local control mode (see Loc/Rem).

Stop
This key stops the motor when in local control mode (see Loc/Rem). In remote control mode, this key also stops the motor when "keypad stop key" is enabled (parameter M3.2.2).

2.4 Operation of the display



The information appearing on the display is divided into menus and submenus.
Scroll through the menus with the up and down arrow keys.
To enter a group, press the OK key.
To return to the previous level, press the Back/*Reset* key.
The location field indicates the menu in which frequency converter can be found.

2.4.1 Icons


File folder


Folder with monitoring parameters


Folder with error history


Favourites folder


Folder with parameters


Parameter


Multiselect parameter


Monitor parameter


Status monitor parameter


Multi-monitoring (9/6/4 parameters in 1 image)


Help


Add to favourites


View details of selected error


Reset active error + retrieve or store parameters

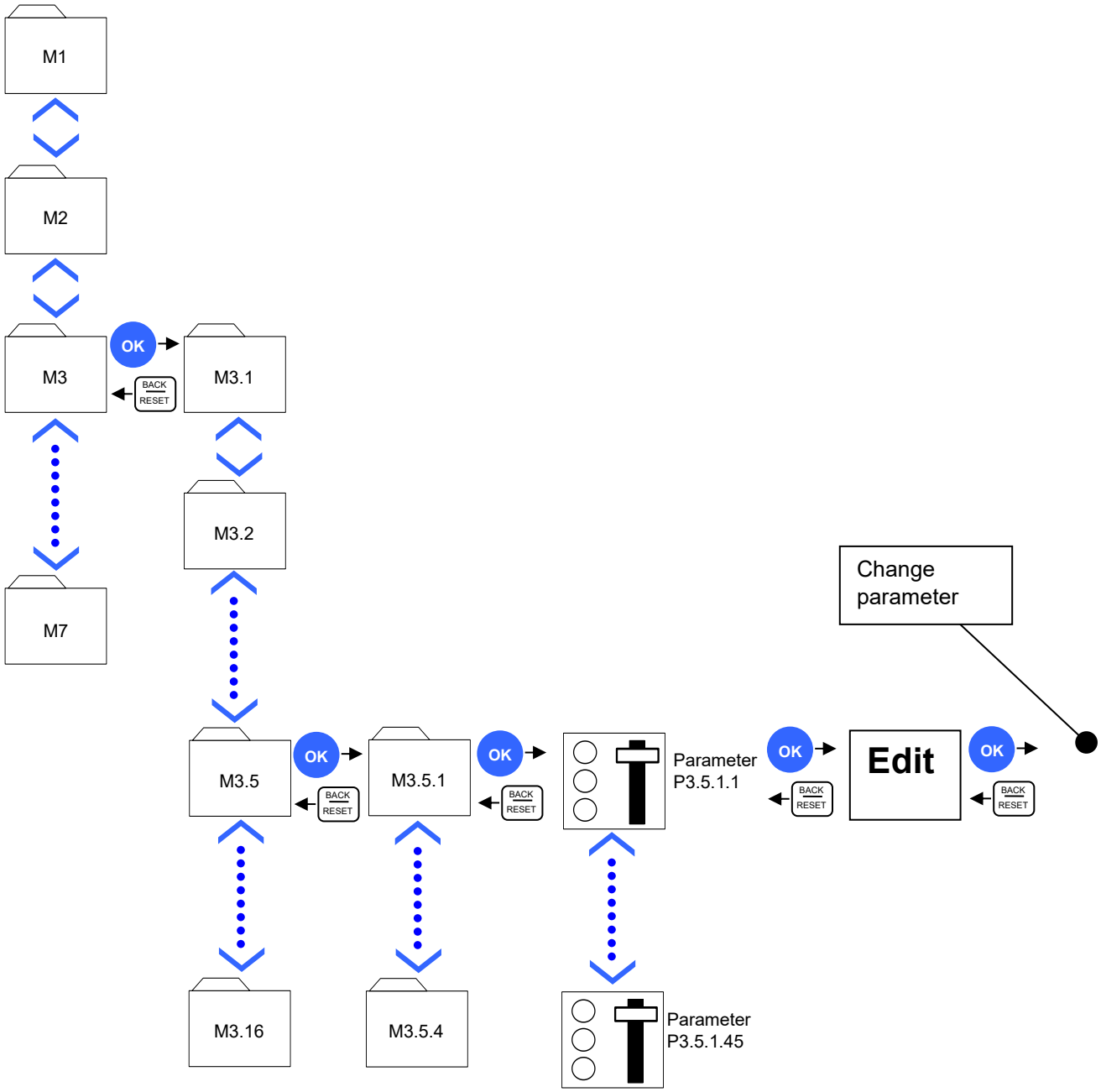

Remove from favourites


Load/save parameter settings

3 PARAMETERS

3.1 Scrolling through parameters

main menu



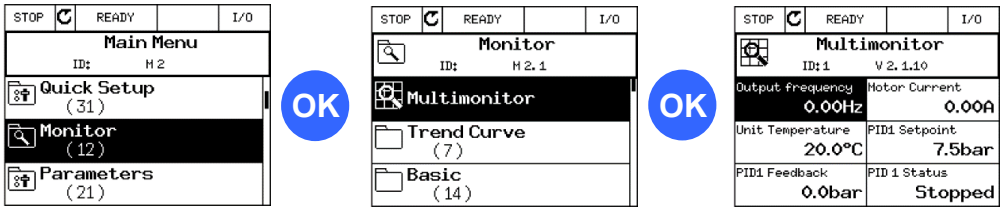
3.2 Viewing and modifying a parameter

For example, we want to view and change the maximum frequency (P 3.3.1.2).
Go to the Main Menu, and scroll up or down with the arrow keys to the Parameters folder, then press OK. Scroll through this menu to References, then press OK.
Scroll to Max. frequency, and press OK.
You have three options; Edit/Help/Add to favourites.
Scroll to Edit, then press OK (the value now starts to flash).
The target frequency can now be entered with the arrow keys. *The place where the change is being made can also be selected with the left and right arrow keys. This figure is underlined.* After changing the value, you can save it by pressing OK.

3.3 Monitoring Menu

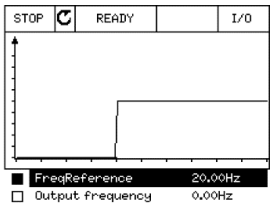
In the monitoring menu, monitor values can be displayed simultaneously via multimonitor 9, 6 or 4. A graph with 2 monitor values can be viewed via the trend curve.

3.3.1 Change multimonitor menu



If you hover over one of the Multimonitor fields and then press OK, you can select the required monitor parameter by scrolling up or down, and confirm with the OK key. (now it's possible to change the values with parameter 6.9.?? in Vacon Live)
The number of display fields can be changed with parameter (P3.11.4); the options are 3x3, 3x2 and 2x2

3.3.2 Trend Curve



Selecting a monitor value below the graph shows a graph of this value. In the trend menus, it is possible to adjust the interval time and the minimum and maximum of the value to be displayed, or to switch to auto-scaling.

3.4 Quick setup parameter group

In addition to the Startup Wizard, the Vacon 100 has a quick setup menu for the most basic parameters. By changing a setting in the quick setup parameter group, this setting will also be changed in the corresponding parameter group.

Code	Parameter	Min	Max		ID	
M1.1	Wizards					Starting various wizards
P1.2	Application				212	Standard HVAC PID control Multi-pump (single drive) Multi-pump (multi-drive)
P1.3	Minimum frequency	0	50	Hz	101	
P1.4	Maximum frequency	20	320	Hz	102	
P1.5	Acceleration time 1	0.1	3,000	s	103	
P1.6	Deceleration time 1	0.1	3,000	s	104	
P1.7	Current limit	3	variable	A	107	
P1.8	Motor type	PM	Induction			PM motor (permanent magnet) Induction motor
P1.9	Rated motor voltage	180	690	V	110	
P1.10	Rated motor frequency	0	320	Hz	111	
P1.11	Rated motor speed	0	62,500	RPM	112	
P1.12	Rated motor current	0	variable	A	113	
P1.13	Motor Cos phi	0	1		120	
P1.14	Energy optimisation	enable	disable		666	
P1.15	Identification				631	No action At standstill With the motor running
P1.16	Start function				505	Running start Ramping
P1.17	Stop function				506	Ramping Freewheel
P1.18	Automatic reset	enable	disable		731	
P1.19	External error				701	No action Alarm Error Error, freewheel
P1.20	Error AI too low				700	No action Alarm Alarm fixed frequency Alarm last frequency Error Error, freewheel
P1.21	Remote operating location	Fieldbus	I/O terminal		172	
P1.22	Reference selection I/O				117	For options, see manual
P1.23	Control panel selection				121	For options, see manual
P1.24	Fieldbus reference selection				122	For options, see manual
P1.25	AI 1 signal range	0 to 10 V 0 to 20 mA	2 to 10 V 4 to 20 mA		379	
P1.26	AI 2 signal range	0 to 10 V 0 to 20 mA	2 to 10 V 4 to 20 mA		390	
P1.27	RO1 function				11001	For options, see manual
P1.28	RO2 function				11004	For options, see manual
P1.29	RO3 function				11007	For options, see manual
P1.30	AO1 function				10050	For options, see manual

The following parameters may differ, depending on the choice of the application.

- P1.31. ... for Standard and HVAC
- P1.32. ... for PID control
- P1.33. ... for multitopump (single drive)
- P1.34. ... for multitopump (multitodrive)

3.5 Parameter group setting

The following menus are available in this parameter group:

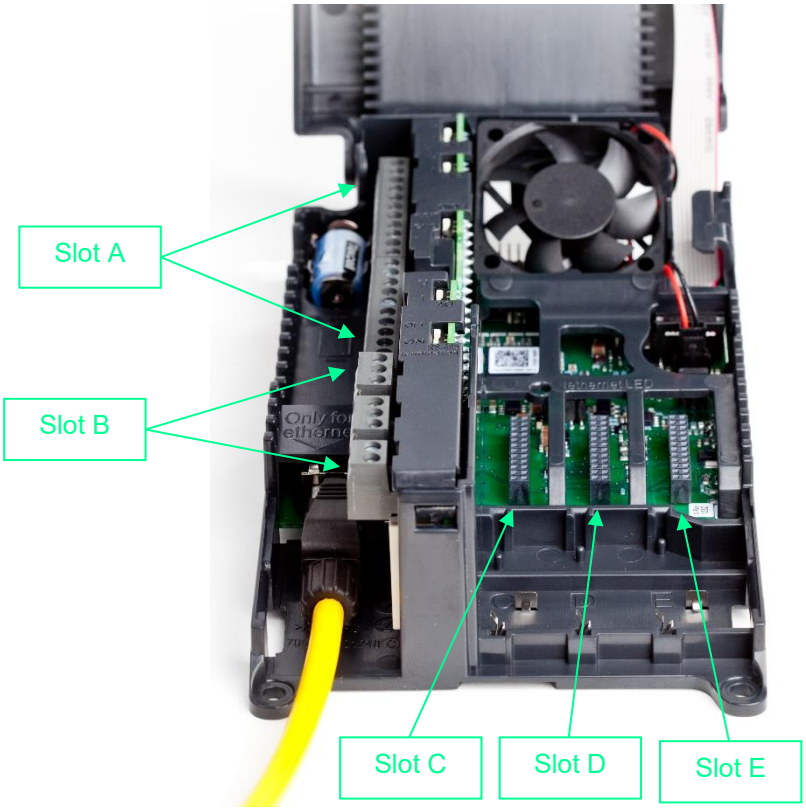
Code	Group name
P3.	**Parameters**
3.1.	Motor settings
3.1.1.	*Motor nameplate*
3.1.2.	*Motor control*
3.1.3.	*Limits*
3.1.4.	*Open loop*
3.1.4.12.	I/f start
3.1.4.12	Stabilators
3.2.	Start/Stop settings
3.3.	References
3.3.1.	*Frequency reference*
3.3.3.	*Fixed frequencies*
3.3.4.	*Motor potentiometer*
3.3.6.	*Flushing*
3.4.	Ramping and Brakes
3.4.1.	*Ramp 1*
3.4.2.	*Ramp 2*
3.4.3.	*Start magnetisation*
3.4.4.	*DC brake*
3.4.5	*Flux Braking*
3.5.	I/O Configuration
3.5.1.	*Digital inputs*
3.5.2.	*Analogue inputs*
3.5.2.1.	Analogue input 1
3.5.2.2.	Analogue input 2
3.5.2.3.	Analogue input 3
3.5.2.4.	Analogue input 4
3.5.2.5.	Analogue input 5
3.5.2.6.	Analogue input 6
3.5.3.	*Digital outputs*
3.5.3.2.	Slot B base
3.5.4.	*Analogue outputs*
3.5.4.1.	Slot A base
3.6.	Fieldbus data map
3.7.	Prohibited frequencies
3.8.	Monitoring limit values
3.9.	Protection
3.9.1.	*General*
3.9.2.	*Motor thermal protection*
3.9.3.	*Motor blocked*
3.9.4.	*Underload*
3.9.5.	*Quick stop*
3.9.8.	*AI low level protection*
3.10.	Automatic reset
3.11.	Application settings
3.12.	Timer functions
3.12.1.	*Interval 1*
3.12.2	*Interval 2*
3.12.3.	*Interval 3*
3.12.4.	*Interval 4*
3.12.5.	*Interval 5*
3.12.6.	*Timer 1*
3.12.7.	*Timer 2*
3.12.8.	*Timer 3*
3.13.	PID regulator
3.13.1.	*Basic settings*
3.13.2.	*Reference values*
3.13.3.	*Feedbacks*
3.13.4.	*Forward control*
3.13.5.	*Sleep function*
3.13.6.	*Feedback monitoring*
3.13.7.	*Pressure loss compensation*
3.13.8.	*Slow fill*
3.13.9.	*Inlet pressure monitoring*
3.13.10.	*Sleep no request detected*
3.13.12.	*Multi setpoint*
3.14.	Ext PID regulator
3.14.1	*Basic settings*
3.14.2.	*Reference values*
3.14.3.	*Feedbacks*
3.14.4.	*Feedback monitoring*
3.15.	Multi-pump
3.15.17.	*Locking signals*
3.15.18.	*Overpressure monitoring*
3.15.19.	*Pump running time*
3.15.22.	*Advanced settings*
3.16.	Maintenance counters
3.17.	Fire mode
3.18.	Motor preheater
3.19.	Frequency convertor customisation
Divided into 10 blocks	
3.21.	Pump control
3.21.1.	*Auto cleaning*
3.21.2.	*Jockey pump*
3.21.3.	*Preparation pump*
3.21.4.	*Anti-blocking*
3.21.5.	*Frost protection*
3.21.6	*Flow switch*
3.23	Adv. Harm. Filter

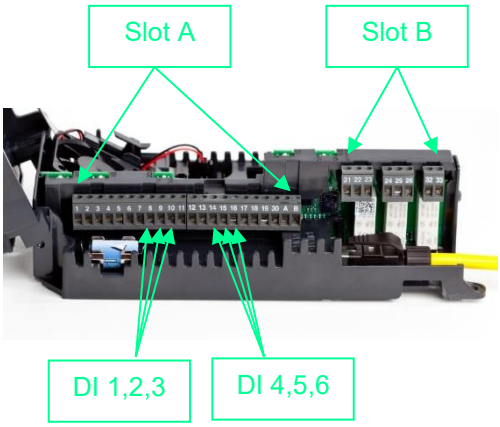
3.6 The distribution of DI (digital inputs)

In the Vacon 100, settings can be per function as to how this has to be activated. This allows multiple functions to be activated with the same DI. It is also possible to control a function with a timer (M3.12), fieldbus or programming block. (M3.19)

The DI can be located in different slots. The standard DIs from 1 to 6 are located on slot A. Depending on the choice of DI expansion, the other DIs may be located on slot C, D or E.

All functions are displayed in parameter group M3.5.1. To associate a function to a DI, first specify in which slot this input is located. Then select the correct DI.





Please note !! When you change a DI, the DI may also be used by another function!

If a function is not in use, it can be set to slot 0. For the regulator, this function does remain active. That means that if a function requests a NO contact, set it to slot 0.1, and if a function requests a NC contact, set it to slot 0.2. Example: If the parameter P3.5.1.11 (close external error) is not used, it should be set to 0.1. Merely changing from slot A (A.3) to slot 0 (0.3) is not sufficient, because the regulator will see a closed contact and generate an error.

Slot 0.1: makes the function false. (Open contact)
Slot 0.2 and higher: makes the function true. (Closed contact)

3.6.1 Functions for DI

Code	Parameter	Default		Description
		slot	position	
P3.5.1.1	Control signal 1 A	A	1	If I/O A is the operating location (forward)
P3.5.1.2	Control signal 2 A	A	2	If I/O A is the operating location (reverse)
P3.5.1.3	Control signal 3 A	0	1	If I/O A is the operating location
P3.5.1.4	Control signal 1 B	0	1	If I/O B is the operating location
P3.5.1.5	Control signal 2 B	0	1	If I/O B is the operating location
P3.5.1.6	Control signal 3 B	0	1	If I/O B is the operating location
P3.5.1.7	Force to I/O B control signal	0	1	Select control signal B
P3.5.1.8	Force to I/O B reference	0	1	Use reference value control signal B (M3.3.1.6)
P3.5.1.9	Force to fieldbus control	0	1	Force operation to fieldbus
P3.5.1.10	Force to display operation	0	1	Force operation to control panel
P3.5.1.11	Close external error	A	3	Open: OK Closed: External error
P3.5.1.12	Open external error	0	2	Open: External error Closed: Ok
P3.5.1.13	Close error reset	A	6	Closed: Reset all active errors
P3.5.1.14	Open error reset	0	1	Open: Reset all active errors
P3.5.1.15	Release	0	2	Closed: regulator is ready
P3.5.1.16	Start block 1	0	2	Open: Regulator ready, starting blocked Closed: Regulator can be started
P3.5.1.17	Start block 2	0	2	Open: Regulator ready, starting blocked Closed: Regulator can be started
P3.5.1.18	Preheating ON	0	1	Open: No action Closed: Preheat activated if (P3.18.1 is set to 2)
P3.5.1.19	Ramp 2 selection	0	1	Switching between ramp 1 and 2
P3.5.1.20	Acc/dec prohibited	0	1	Open: Acceleration and deceleration permitted Closed: Acceleration and deceleration not permitted
P3.5.1.21	Fixed frequency selection 0	A	4	Binary selection for fixed frequency
P3.5.1.22	Fixed frequency selection 1	A	5	Binary selection for fixed frequency
P3.5.1.23	Fixed frequency selection 2	0	1	Binary selection for fixed frequency
P3.5.1.24	Increase motor pot	0	1	Motor pot reference goes up
P3.5.1.25	Decrease motor pot	0	1	Motor pot reference goes down
P3.5.1.26	Quick stop activation	0	2	Open: Activated according to (P3.9.5)
P3.5.1.27	Timer 1	0	1	Start Timer 1 programmed with parameters (P3.12.6)
P3.5.1.28	Timer 2	0	1	Start Timer 2 programmed with parameters (P3.12.7)
P3.5.1.29	Timer 3	0	1	Start Timer 3 programmed with parameters (P3.12.8)
P3.5.1.30	PID 1 reference increase	0	1	Open: No amplification Closed: Amplification
P3.5.1.31	PID 1 SP selection	0	1	Open: Reference value 1 Closed: Reference value 2
P3.5.1.32	External PID - start signal	0	2	Open: External PID stopped Closed: External PID controls (P3.14)
P3.5.1.33	External PID SP selection	0	1	Open: Reference value 1 Closed: Reference value 2
P3.5.1.34	Reset maintenance counter 1	0	1	Closed: Reset maintenance counter
P3.5.1.36	Activate flushing reference	0	1	Closed: Flushing function active (P3.3.6.2) Please note! Regulator starts when activating this function
P3.5.1.38	Open fire mode activation	0	2	Open: Fire mode active (M3.17) Closed: No action

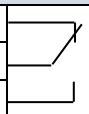
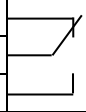
Code	Parameter	Default		Description
		slot	position	
P3.5.1.39	Close fire mode activation	0	1	Open: No action Closed: Fire mode active (M3.17)
P3.5.1.40	Fire mode reverse	0	1	Open: Forward Closed: Reverse This function is only active in fire mode
P3.5.1.41	Auto cleaning active	0	1	Closed: Auto cleaning active (on opening, the function stops) Please note! Regulator starts when activating this function
P3.5.1.42	Pump 1 block	0	1	Open: Inactive Closed: Active
P3.5.1.43	Pump 2 block	0	1	Open: Inactive Closed: Active
P3.5.1.44	Pump 3 block	0	1	Open: Inactive Closed: Active
P3.5.1.45	Pump 4 block	0	1	Open: Inactive Closed: Active
P3.5.1.46	Pump 5 block	0	1	Open: Inactive Closed: Active
P3.5.1.47	Pump 6 block	0	1	Open: Inactive Closed: Active
P3.5.1.48	Pump 7 block	0	1	Open: Inactive Closed: Active
P3.5.1.49	Pump 8 block	0	1	Open: Inactive Closed: Active
P3.5.1.52	Energy counter reset	0	1	Closed: Energy trip counter reset
P3.5.1.53	Parameter set 1/2 selection	0	1	Open: Parameter setting 1 is selected Closed: Parameter setting 2 is selected
P3.5.1.54	Multi setpoint select 0	0	1	Binary selection for multi setpoint
P3.5.1.55	Multi setpoint select 1	0	1	Binary selection for multi setpoint
P3.5.1.56	Multi setpoint select 2	0	1	Binary selection for multi setpoint
P3.5.1.57	Multi setpoint select 3	0	1	Binary selection for multi setpoint
P3.5.1.58	Flow switch	0	2	Select digital input flow switch
P3.5.1.59	AHF over temperature	0	1	Activate AHF over temperature

The default values listed above are applicable when using the default application. These values may change if other applications are used

3.6.2 Terminals

According to the settings of PID control 6.4.1

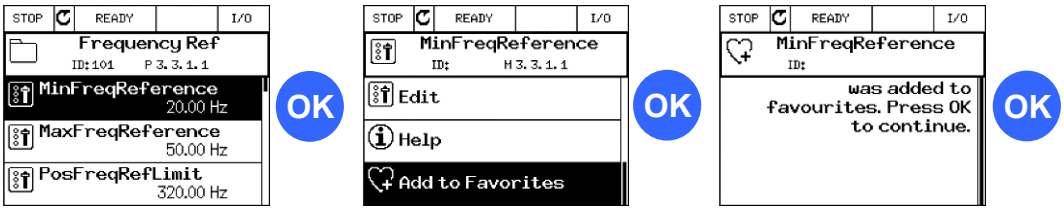
Basic I/O board			
terminal		**signal**	**description (PID settings)**
1	+10 V_{ref}	Reference output	Power supply for potentiometer, etc.
2	AI 1+	Analogue input, 0 to 10 V DC or 0/4 to 20 mA	Frequency reference (programmable)
3	AI 1-	Analogue input reference potential	Reference potential inputs and outputs
4	AI 2+	Analogue input, 0 to 10 V DC or 0/4 to 20 mA	Frequency reference (programmable)
5	AI 2-	Analogue input reference potential	
6	+ 24 V	Output voltage control	Power supply for contacts, etc. max 0.1 A
7	GND	I/O reference potential	Reference potential inputs and outputs
8	DI 1	Digital input 1	Start (programmable contact)
9	DI 2	Digital input 2	Start cc(programmable contact)
10	DI 3	Digital input 3	External Fault (programmable contact)
11	CM	Additional reference potential for DI 1 to DI 6	Is connected to GND (earth). Can also be insulated from GND by jumpers
12	+ 24 V	Output voltage control	Power supply for contacts, etc. max 0.1 A
13	GND	I/O reference potential	Reference potential inputs and outputs
14	DI 4	Digital input 4	Preset frequency selection 0. (Binary) (programmable contact)
15	DI 5	Digital input 5	Preset frequency selection 1 (Binary) (programmable contact)
16	DI 6	Digital input 6	Fault reset (programmable contact)
17	CM	Additional reference potential for DI 1 to DI 6	Is connected to GND (earth). Can also be insulated from GND by jumpers
18	AO 1+	Analogue output	Output frequency (programmable) range 0 to 20 mA / R max 500.Ω
19	AO-/GND		
30	+24 V in	24 V input voltage	
A	RS-485		
B	RS-485		

Relay board 1				
21	RO1 nc		Relay output 1	Run (programmable)
22	RO1 com			
23	RO1 no			
24	RO2 nc		Relay output 2	Fault (programmable)
25	RO2 com			
26	RO2 no			
32	RO3 com		Relay output 3	Ready (programmable)
33	RO3 no			

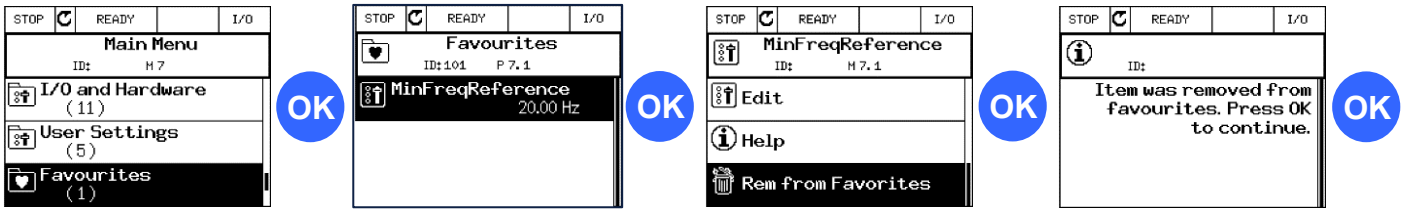
3.7 Favorites folder

The Vacon 100 frequency converter allows compilation of a folder containing frequently-used parameters. It means you can access all the parameters from a single folder, and modify them if necessary. Please note! The favourites folder is deleted when changing the firmware, although it can be saved in the control panel.

3.7.1 Saving parameters in the favourites folder



3.7.2 Removing parameters from the favourites folder



3.8 Cooling fan control

Parameter P5.6.1.1 (Fan optimisation) turns the unit's cooling fan on or off. (From MR6 speed control)

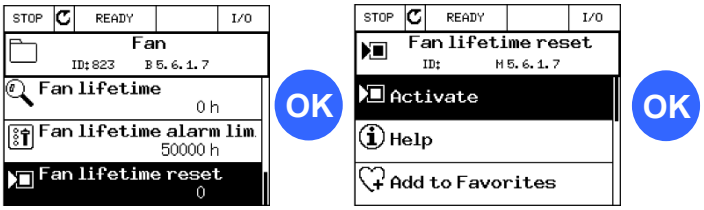
If this parameter is switched on, the cooling fan will be switched to the unit temperature.

When switching the power supply on, the cooling fan will always run and then turn off after around 5 minutes, if:
- the regulator is in ready or sleep state.
- the unit temperature is not too high.

If the regulator is in run mode, the fan will run continuously regardless of the temperature of the unit.

3.8.1 Cooling fan lifetime reset

When you change the cooling fan. You need to reset the fan lifetime with parameter B5.6.1.7. This is to prevent a unnecessary alarm when the Vacon detects that the fan lifetime is expired.

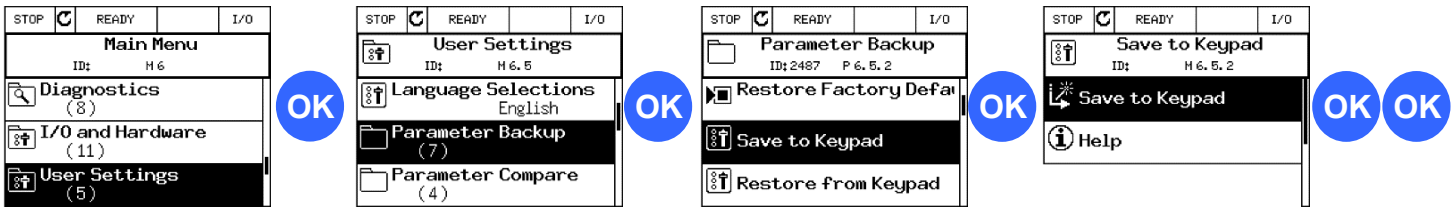


3.9 Default page display

Parameter P5.7.2 allows the default page to be determined (e.g. Multimonitor). The timeout period is entered in parameter P5.7.1.

If the keys of the regulator are not used before the pre-set timeout period, the display will return to the default page.

3.10 Saving and loading parameter setting + factory setting



Parameter backup allows saved parameter settings to be loaded from the control panel. In addition, factory settings can also be loaded, and 2 user-defined parameter settings saved or loaded.

3.11 Parameter lock

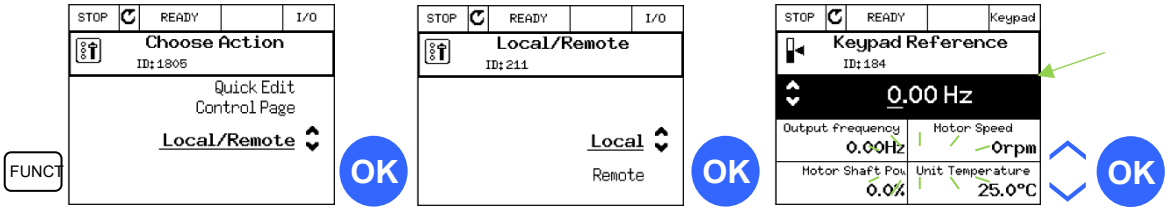
To prevent unauthorised changes, it is possible to hide the parameter folders with an access code. Go to parameter M8.2, and set an access code to protect parameters. Go to parameter M8.1 and change to monitor or favourites.
Monitor: only the monitoring and main menus are visible
Favourites: Only main menus visible, and only parameters in favourites are available.

The parameter lock is deactivated by setting parameter M8.1 to normal and confirming with the access code.

Please note!
Make arrangements within your organisation on the use of this code, so that your colleagues can also modify this control.

3.12 Handbediening

It is possible to operate the controller manually. Press the function key and select Local/Remote in the menu. Then select Local.



Next, select the black frequency reference field to adjust the frequency. The controller can now be operated manually using the start and stop buttons. The monitor fields shown below can be arranged as desired.
The operating page and the option to change the direction of rotation can be found via the function key.
Please note! The configured control will only function again when the controller is set back to Remote via the function key.

3.13 Faults and alarms

Menu M4 (diagnosis) contains active errors and the error history.

3.13.1 Errors

Error code	Error
1	Overcurrent
2	Overvoltage
3	Earthing error
5	Charging switch
7	Saturation trip
8	System error
9	Undervoltage
10	Input phase
11	Monitoring output phase
12	Braking chopper monitor
13	Heatsink temperature too low
14	Heatsink temperature too high
15	Motor blocked
16	Motor temperature too high
17	Motor under load
19	Overload power
25	Operation error motor
26	Cannot start
29	ATEX - thermistor
30	Safety configuration
32	Fan cooling
33	Fire mode enabled
37	Component changed
38	Component added
39	Component removed
40	Component unknown

Error code	Error
41	IGBT temperature
44	Component changed
45	Component added
46	Real-time clock
47	Software update
50	Error AI too low
51	External error
52	Keypad communication error
53	Fieldbus error
54	Option board slot error
57	Identification
63	Fault/alarm quick stop
65	PC communication error
66	Thermistor error
68	Fault/alarm maintenance counter
69	Fieldbus indication error
76	Start blocked
77	> 5 connections
100	Timeout slow fill
101	PID 1 outside pre-set values
105	PID 2 outside pre-set values
109	Inlet pressure monitoring
111	Temperature error 1
112	Temperature error 2
113	Pump running time
300	Not supported

Errors are explained in the application manual.

3.14 Monitoring values

Monitor value, Base		Value	ID
V2.3.1	Output frequency	Hz	1
V2.3.2	Reference frequency	Hz	25
V2.3.3	Motor speed	RPM	2
V2.3.4	Motor current	A	3
V2.3.5	Motor torque	%	4
V2.3.7	Motor shaft power	%	5
V2.3.8	Motor shaft power	kW/hp	73
V2.3.9	Motor voltage	V	6
V2.3.10	DC link voltage	V	7
V2.3.11	Unit temperature	°C	8
V2.3.12	Motor temperature (calculated)	%	9
V2.3.13	Motor preheater		1228
V2.3.15	kWh trip counter low	kWh	1054
V2.3.16	kWh trip meter high	kWh	1067

Monitor value, I/O		Value	ID
V2.4.1	Slot A DIN 1,2,3		15
V2.4.2	Slot A DIN 4,5,6		16
V2.4.3	Slot B RO 1,2,3		17
V2.4.4	Analogue input 1	%	59
V2.4.5	Analogue input 2	%	60
V2.4.6	Analogue input 3	%	61
V2.4.7	Analogue input 4	%	62
V2.4.8	Analogue input 5	%	75
V2.4.9	Analogue input 6	%	76
V2.4.10	Slot A AO1	%	81

Monitor value, Temperature inputs		Value	ID
V2.5.1	Temperature input 1	° C/F	50
V2.5.2	Temperature input 2	° C/F	51
V2.5.3	Temperature input 3	° C/F	52

Monitor value, Extras & Advanced		Value	ID
V2.6.1	Frequency convertor status word		43
V2.6.2	Ready		78
V2.6.3	Application status word 1		89
V2.6.4	Application status word 2		90
V2.6.5	DIN status word 1		56
V2.6.6	DIN status word 2		57
V2.6.7	Motor current 1 decimal		45
V2.6.8	Frequency reference source		1495
V2.6.9	Last active error code		37
V2.6.10	Last active error ID		95
V2.6.11	Last active alarm code		74
V2.6.12	Last active alarm ID		94
V2.6.13	Status motor regulator		77
V2.6.14	Motor shaft power 1 decimal	kW	98

Monitor value, Timer functions		Value	ID
V2.7.1	TC 1, TC 2, TC 3		1441
V2.7.2	Interval 1		1442
V2.7.3	Interval 2		1443
V2.7.4	Interval 3		1444
V2.7.5	Interval 4		1445
V2.7.6	Interval 5		1446
V2.7.7	Timer 1		1447
V2.7.8	Timer 2		1448
V2.7.9	Timer 3		1449
V2.7.10	Real-time clock		1450

Monitor value PID regulator		Value	ID
V2.8.1	PID1 reference value	var.	20
V2.8.2	PID1 feedback	var.	21
V2.8.3	PID1 feedback (1)	var	15541
V2.8.4	PID1 feedback (2)	var	15542
V2.8.5	PID1 error value (difference)	var.	22
V2.8.6	PID1 output value	%	23
V2.8.7	PID1 status		24

Monitor value, External PID regulator		Value	ID
V2.9.1	External PID reference value	var.	83
V2.9.2	External PID actual value	var.	84
V2.9.3	External PID error value (difference)	var.	85
V2.9.4	External PID output value	%	86
V2.9.5	External PID status		87

Multi-pump monitor		Value	ID
V2.10.1	No. of motors in operation (active)		30
V2.10.2	Autochange		1113
V2.10.3	Next autochange		1503
V2.10.4.	Operating mode		1505
V2.10.5	Multi-pump, status		15507
V2.10.6	Communication status		15506
V2.10.7	Pump (1) running time	h	15510
V2.10.8	Pump (2) running time	h	15511
V2.10.9	Pump (3) running time	h	15512
V2.10.10	Pump (4) running time	h	15513
V2.10.11	Pump (5) running time	h	15514
V2.10.12	Pump (6) running time	h	15515
V2.10.13	Pump (7) running time	h	15516
V2.10.14	Pump (8) running time	h	15517

Monitor value, Maintenance counters		Value	ID
V2.11.1	Maintenance counter 1	h/kRev	1101

Monitor value, Fieldbus		Value	ID
V2.12.1 to V2.12.8.16	Various Fieldbus values		Var.

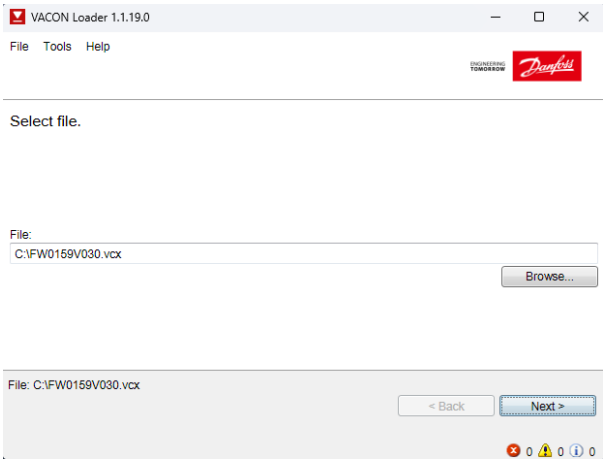
Monitor Drive Customizer		Value	ID
V2.13.1 to V2.13.11	Various Drive Customizer values		15020 to 15200

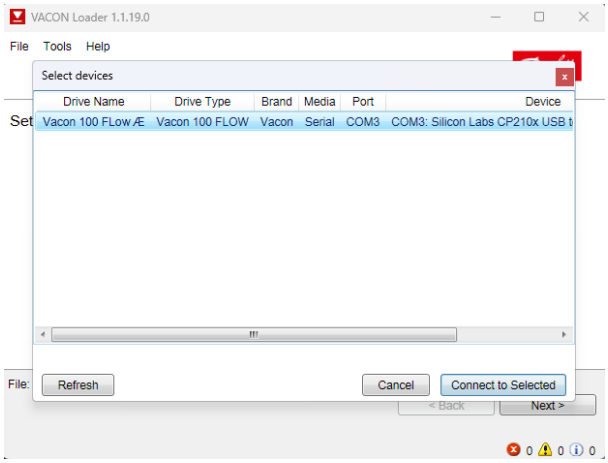
4 VACON SOFTWARE

On the Danfoss website you can download the Vacon Live program also you can install the Vacon Loader program to.

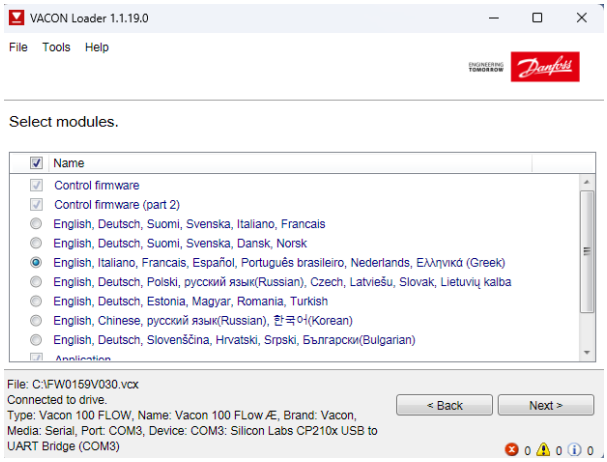
4.1 Vacon Loader

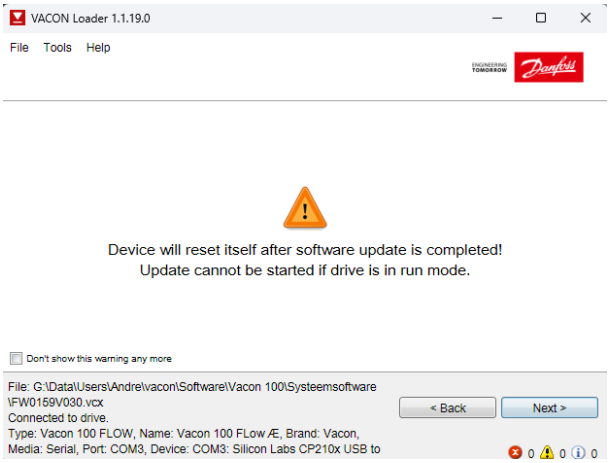
Vacon Loader is intended to update Vacon 100 drives with new firmware, current version FW0159V030. In addition, this program allows you to install a different language package on the drive. This is only possible when using a Vacon 100 programming cable. The cable must always be connected to the display port. Start Vacon Loader and search for the new firmware. Click Next. The program will then search for the available drive. Select the correct drive and click Next again.



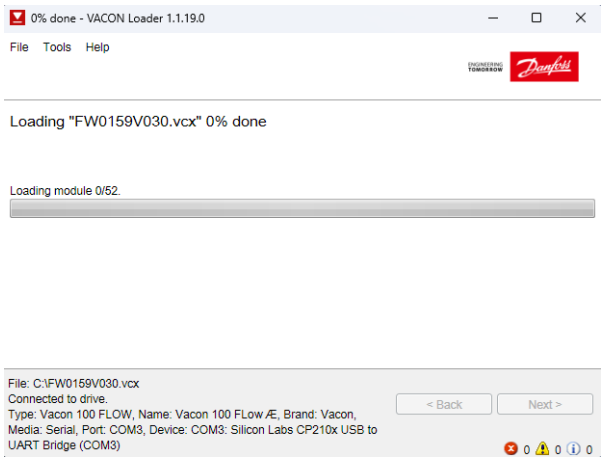


After that, you can select an available language package. Click Next. The program will indicate that a drive can only be updated with new firmware when it is in stop mode. Click Next to continue.



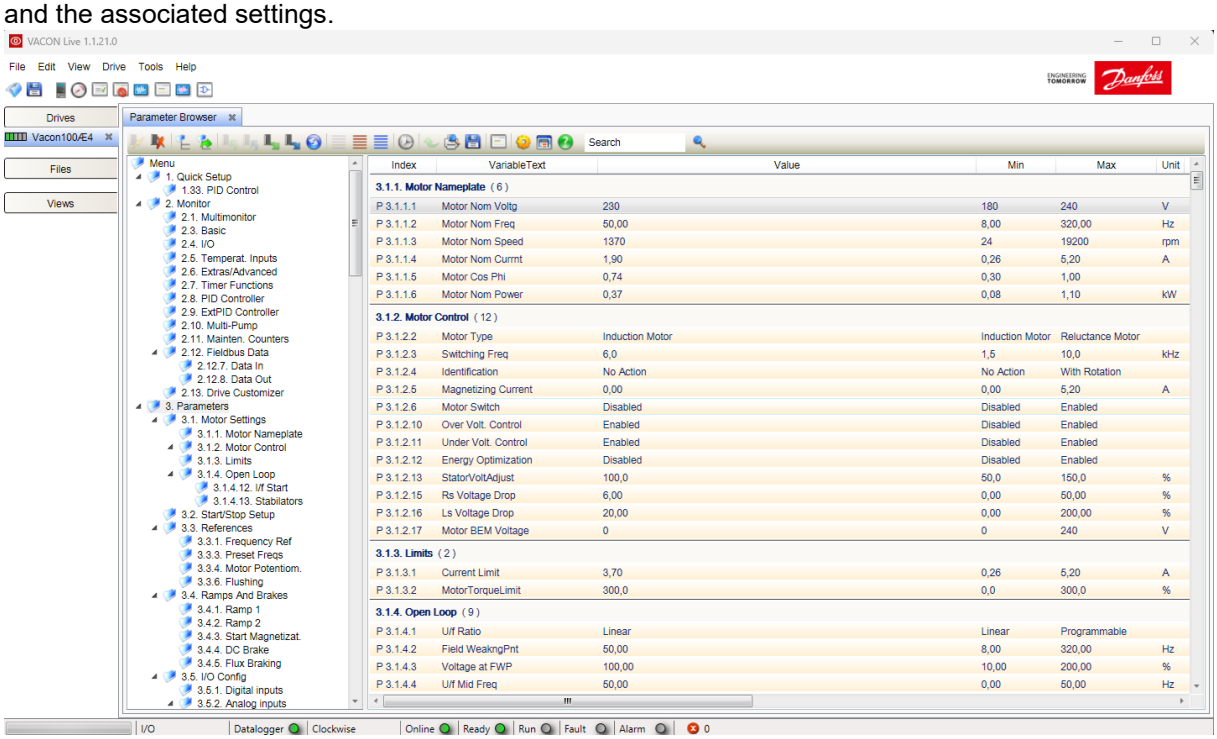


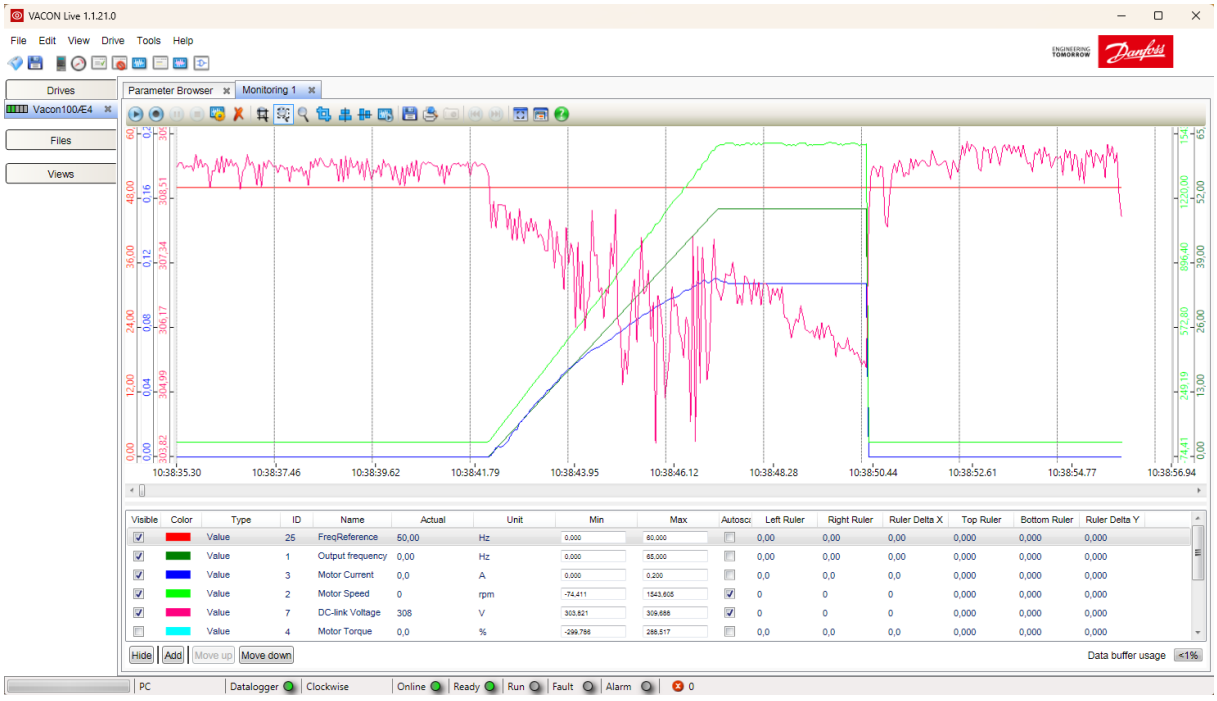
The new firmware will now be installed. This process can take approximately 15 minutes.



4.2 Vacon Live

In Vacon Live, you can view and modify parameters via your PC. This is possible using a Vacon programming cable or an Ethernet connection. Connecting with the programming cable works the same way as in Vacon Loader. The program will automatically display the available drives.
When connecting via an Ethernet cable, it is necessary to be familiar with working with IP addresses and the associated settings.

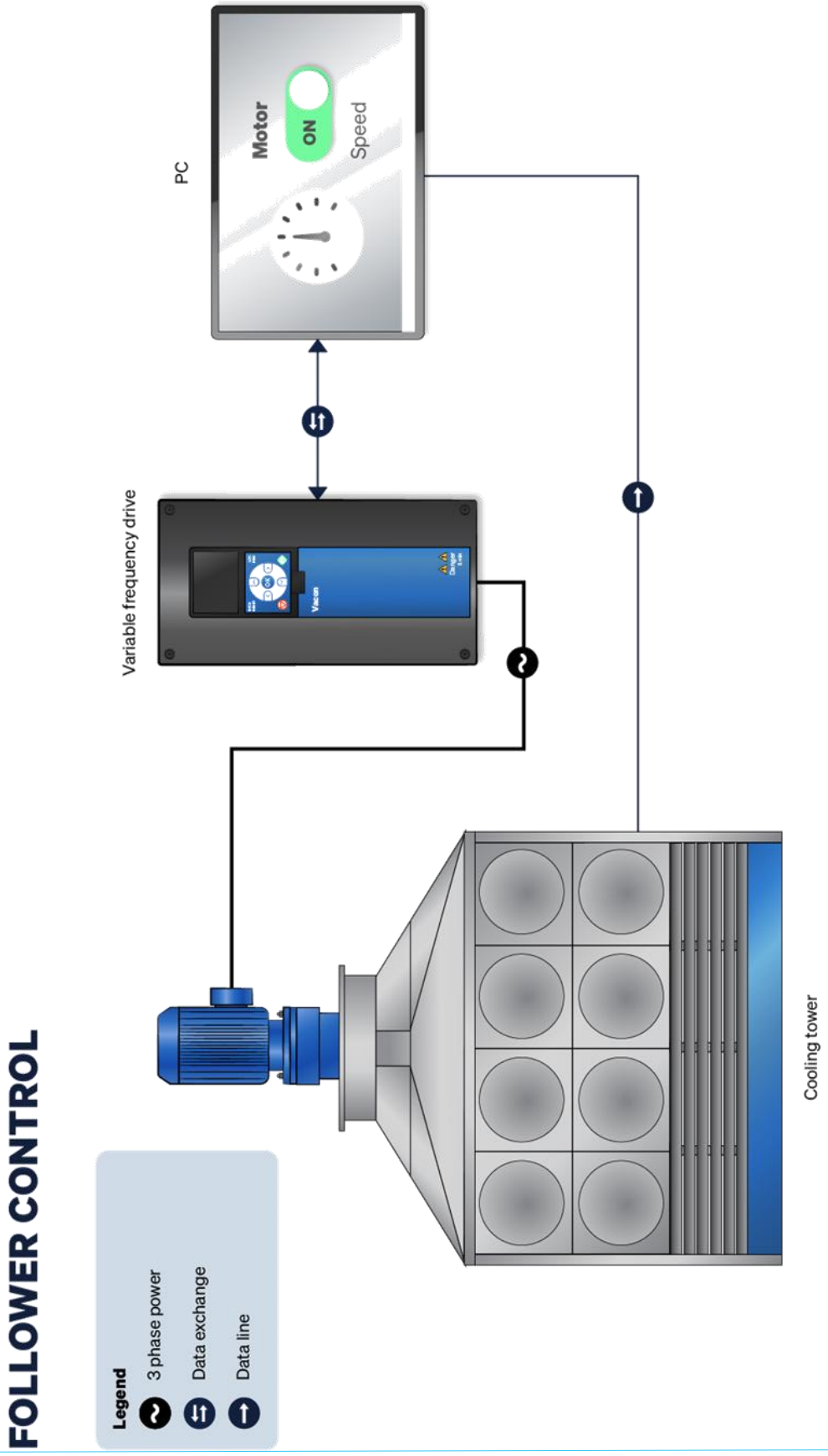




5 FOLLOW-UP CONTROL

When using the application examples in this manual, you must always start from the factory settings (P6.5.1).

5.1 Connection diagram Follow-up control



5.2 Configure application via Wizard

At the first startup, or via parameter B1.1.1, the application wizard is started.

Step	Parameter	Number	Description
1	Language Selection	P6.1	Englisch
2	Daylight saving	P5.5.5	EU
3	Time	P5.5.2	hh:mm:ss
4	Year	P5.5.4	2026
5	Date	P5.5.3	dd:mm
6	Startup Wizard?		Yes
7	Application	P1.2	Standard
8	Motor Type	P3.1.2.2	Reluctance Motor, PM Motor, **Induction Motor**
9	Rated voltage	P3.1.1.1	Varies
10	Rated frequency	P3.1.1.2	8 to 320 Hz.
11	Rated motor speed	P3.1.1.3	24 to 19,200 rpm
12	Rated motor current	P3.1.1.4	Varies
13	Cos phi of the motor	P3.1.1.5	0.3 to 1
14	Minimum frequency	P3.3.1.1	0 Hz. … P3.3.1.2
15	Maximum frequency	P3.3.1.2	P3.3.1.1 … 320 Hz.
16	Acceleration time	P3.4.1.2	0.1 to 300 s
17	Deceleration	P3.4.1.3	0.1 to 300 s
18	Application Wizard?		Yes
19	Operating location:	P3.2.1	I/O - Terminal
20	Logic I/O A	P3.2.6	Forward-Backward (edge) If reset error, break start contact Forward-reverse If reset error, autostart Change also P3.9.1.15 (no action)
21	Wizard is ready		OK

Now you can go on with the specific parameters in the next chapters.

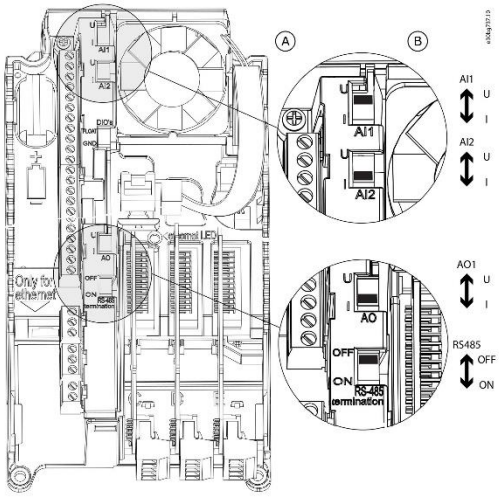
- 5.2.1 0 - 10 V Follow-up control parameters
- 5.2.2 (0) 4 to 20 mA Follow-Up control parameters
- 5.2.3 Up-down control parameters

5.2.1 0 - 10 V Follow-up control parameters

Continuation of 5.2 Start Application via Wizard

Parameter group	Description	Setting
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	Current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	Ramping (pump)/Running start (fan)
P3.2.5	Stop function	Freewheel (fan)/Ramping (pump)
References		
Frequency reference		
P3.3.1.5	I/O reference A	AI 1
I/O Configuration		
Analogue input 1		
P3.5.2.1.2	AI 1 signal filter time	0 sec.
P3.5.2.1.3	AI 1 signal range	0 to 10 V/0 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action

- The 0 to 10 V signal is connected to AI 1 on the 2 (+) and 3 (to) terminals.
- The tracking control is started by connecting 8 (DI 1) to 6 (+24 V).
- Make sure that dipswitch AI 1 is in the Volt signal position (up).



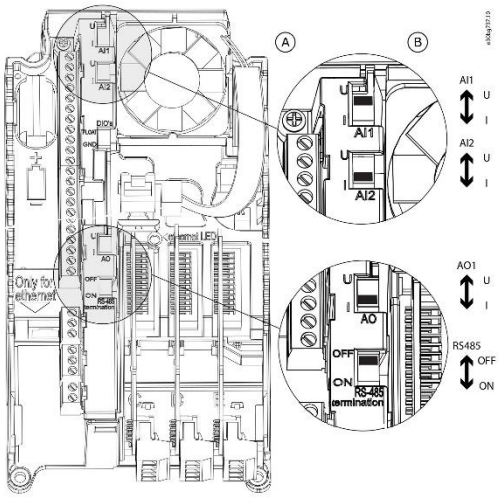
Location and selection of dipswitch AI 1

5.2.2 (0) 4 to 20 mA Follow-Up control parameters

Continuation of 5.2 Start Application via Wizard

Parameter group	Description	Setting
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	Current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	Ramping (pump)/Running start (fan)
P3.2.5	Stop function	Freewheel (fan)/Ramping (pump)
References		
Frequency reference		
P3.3.1.5	I/O reference A	AI 2
I/O Configuration		
Analogue input 2		
P3.5.2.2.2	AI 2 signal filter time	0 sec.
P3.5.2.2.3	AI 2 signal range	2 to 10 V/4 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action

- The 4 to 20 mA signal is connected to AI 2 on the 4 (+) and 5 (to) terminals.
- The tracking control is started by connecting 8 (DI 1) to 6 (+24 V).
- Make sure that dipswitch AI 2 is in the Current signal position (down).



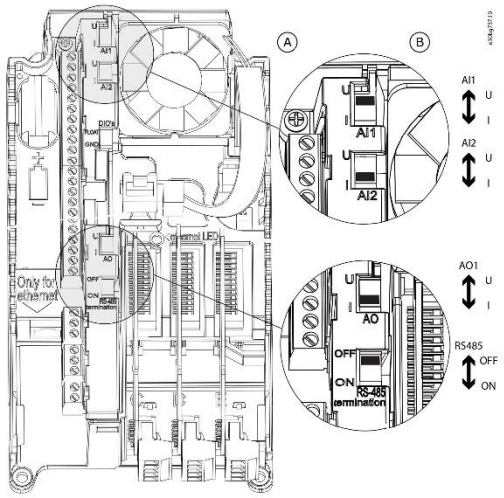
Location and selection of dipswitch AI 2

5.2.3 Up-down control parameters

Continuation of 5.2 Start Application via Wizard

Parameter group	Description	Setting
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	Current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	Ramping (pump)/Running start (fan)
P3.2.5	Stop function	Freewheel (fan)/Ramping (pump)
References		
Frequency reference		
P3.3.1.5	I/O reference A	Motor potentiometer
Motor potentiometer		
P3.3.4.3	Motor potentiometer ramping time	... Hz/s (equivalent to external control)
P3.3.4.4	Reset motor potentiometer	none/during stop/during power failure
I/O Configuration		
Digital inputs		
P3.5.1.1	Control signal 1 A (start clockwise)	DigIN Slot A.1
P3.5.1.2	Control signal 2 A (start counter clockwise)	DigIN Slot 0.1
P3.5.1.11	Close external error	DigIN Slot 0.1
P3.5.1.24	Increase motor pot	DigIN Slot A.2
P3.5.1.25	Decrease motor pot	DigIN Slot A.3
Analogue output		
P3.5.4.1.1	AO1 function	Output frequency
P3.5.4.1.3	AO 1 signal range	2 to 10 V/4 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action

- The control is started by connecting 8 (DI 1) to 6 (+24 V).
- Increase speed, connect terminal 9 (DI 2) to 6 (+24 V).
- Decrease speed, connect terminal 10 (DI 3) to 6 (+24 V).
- Make sure that dipswitch AO 1 is in the Current signal position (down).



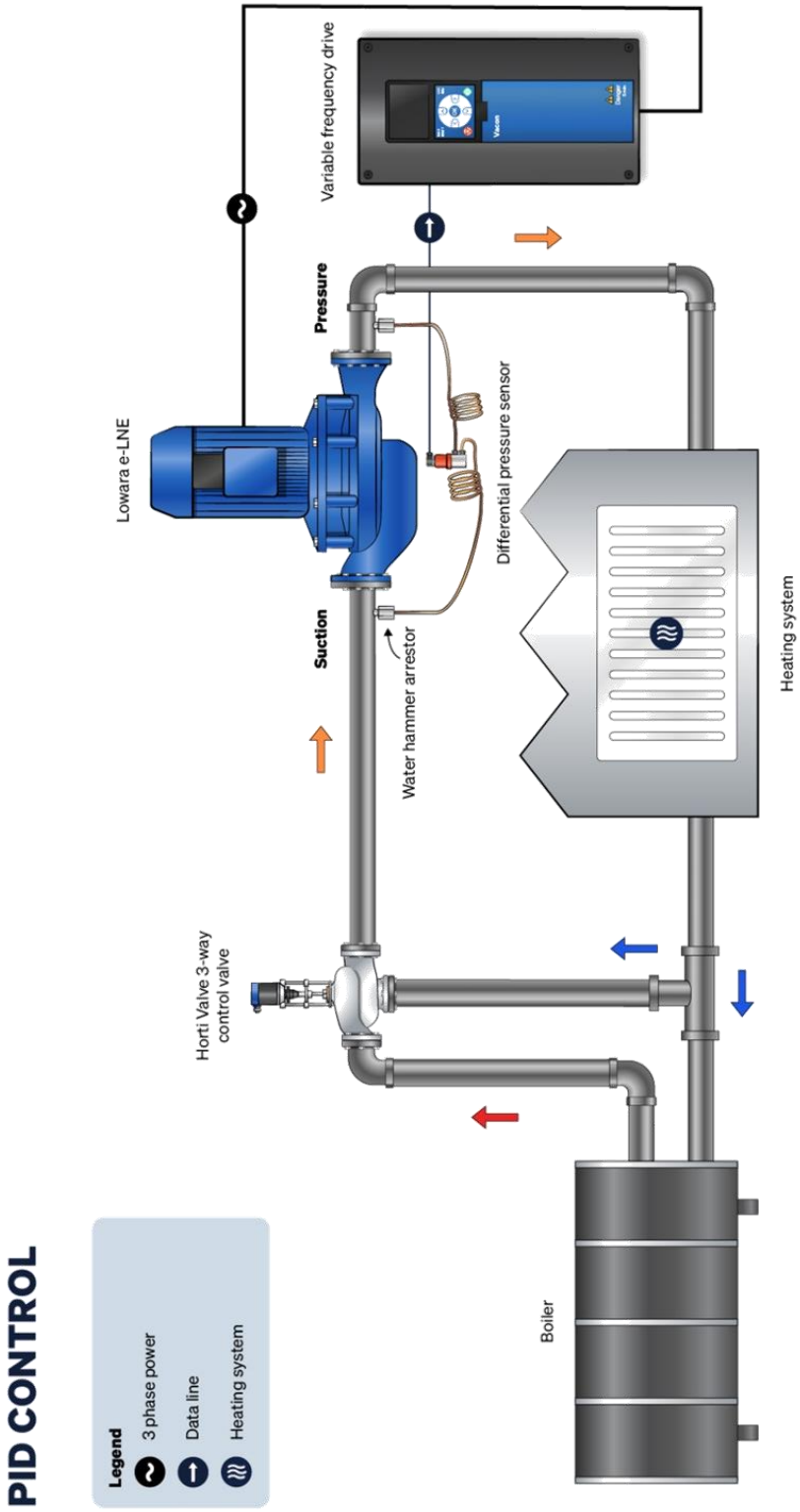
Location and selection of dipswitch AO 1

6 PID SYSTEMS

When using the application examples in this manual, you must always start from the factory settings (P6.5.1).

6.1 PID Heating

6.1.1 Connection diagram heating (PID)



6.1.2 Configure application via Wizard

At the first startup, or via parameter B1.1.1, the application wizard is started.

Step	Parameter	Number	Description
1	Language Selection	P6.1	Englisch
2	Daylight saving	P5.5.5	EU
3	Time	P5.5.2	hh:mm:ss
4	Year	P5.5.4	2026
5	Date	P5.5.3	dd:mm
6	Sartup Wizard?		Yes
7	Application	P1.2	PID Control
8	Motor Type	P3.1.2.2	ReluctanceMotor, PM Motor, **Induction Motor**
9	Rated voltage	P3.1.1.1	Varies
10	Rated frequency	P3.1.1.2	50/(60) Hz
11	Rated motor speed	P3.1.1.3	…… rpm
12	Rated motor current	P3.1.1.4	……A
13	Cos phi of the motor	P3.1.1.5	0.3 to 1
14	Minimum frequency	P3.3.1.1	e.g. 5 Hz
15	Maximum frequency	P3.3.1.2	50/(60) Hz
16	Acceleration time	P3.4.1.2	e.g. 50 s
17	Deceleration	P3.4.1.3	e.g. 50 s
18	Application Wizard?		Yes
19	Control location		I/O - terminals
20	Selection of process unit	P3.13.1.4	Varies options e.g. mbar
21	Minimum process unit	P3.13.1.5	Minimum value of sensor, e.g. (0 -0,5 bar) = 0 mbar
22	Maximum process unit	P3.13.1.6	Maximum value of sensor, e.g. 500 mbar
23	Decimal process unit	P3.13.1.7	Decimal places (0 to 0.0000)
24	Feedback 1 source selection	P3.13.3.3	Position sensor, e.g. (AI 2)
25	Signal range analogue inputs		0 to 10 V/0 to 20 mA **2 to 10 V/4 to 20 mA**
26	Inversion error	P3.13.1.8	**Normal**/inverted
27	Reference point source selection	P3.13.2.6	Reference location PID (**Keypad SP1**)
28	Control panel reference point 1	P3.13.2.1	Fill in operating point e.g. 80 mbar
29	Sleep function?		No
24	Wizard is ready		OK

Now we can fill in the specific parameters

6.1.3 PID control (Heating) parameters

Parameter group	Description	Setting
P1.2	Application	PID control
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	**Ramping** Running start
P3.2.5	Stop function	Ramping
P3.2.6	Logic I/O A	Forward-Beckward (edge) If reset error, break start contact Forward-Backwar If reset error, autostart Change also P3.9.1.15 (no action)
References		
Frequency reference		
P3.3.1.1	Minimum frequency reference	e.g. 5 Hz*
P3.3.1.5	I/O reference A	PID
Flushing		
P3.3.6.2	Flushing frequency	... Hz if DI 6 is made (No start contact required)
I/O Configuration		
Digital inputs		
P3.5.1.1	Control signal 1 A (start clockwise)	DigIN Slot A.1
P3.5.1.4	Control signal 1 A	DigIN Slot 0.1
P3.5.1.7	Force to I/O control	DigIN Slot 0.1
P3.5.1.8	Force to I/O B reference	DigIN Slot 0.1
P3.5.1.11	External error when closed	DigIN Slot 0.1
P3.5.1.13	Close error reset	DigIN Slot A.3
P3.5.1.31	PID Select SP 2	DigIN Slot A.4
P3.5.1.36	Flushing reference asset	DigIN Slot A.6
Analogue input 2		
P3.5.2.2.3	AI 2 signal range	2 to 10 V/4 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action
AI level low		
P3.9.8.2	Analogue input low	error
PID Regulator 1		
Basic settings		
P3.13.1.1	PID gain	50% (> the control speeds up)
P3.13.1.2	PID control I time	10 (> the control slows down)
P3.13.1.3	PID contr. D time	0,5 (1 > regulation lags behind)
P3.13.1.4	Selection of process unit	mbar.
P3.13.1.5	Min. process unit	minimum value sensor (reading sensor) e.g. 0 mbar
P3.13.1.6	Max. process unit	maximum value sensor (reading sensor) e.g. 500 mbar
P3.13.1.7	Decimal process unit	0 Readout behind decimal point (monitoring)
Reference points		
P3.13.2.1	Control panel reference point 1	Setting operating point 1 (bar) e.g. 80 mbar
P3.13.2.2	Control panel reference point 2	Setting operating point 2 (bar)
P3.13.2.6	Reference point source 1 selection	Keypad SP 1
P3.13.2.10	Reference point source 2 selection	Keypad SP 2
Feedback		
P3.13.3.3	Feedback 1 source selection	AI 2

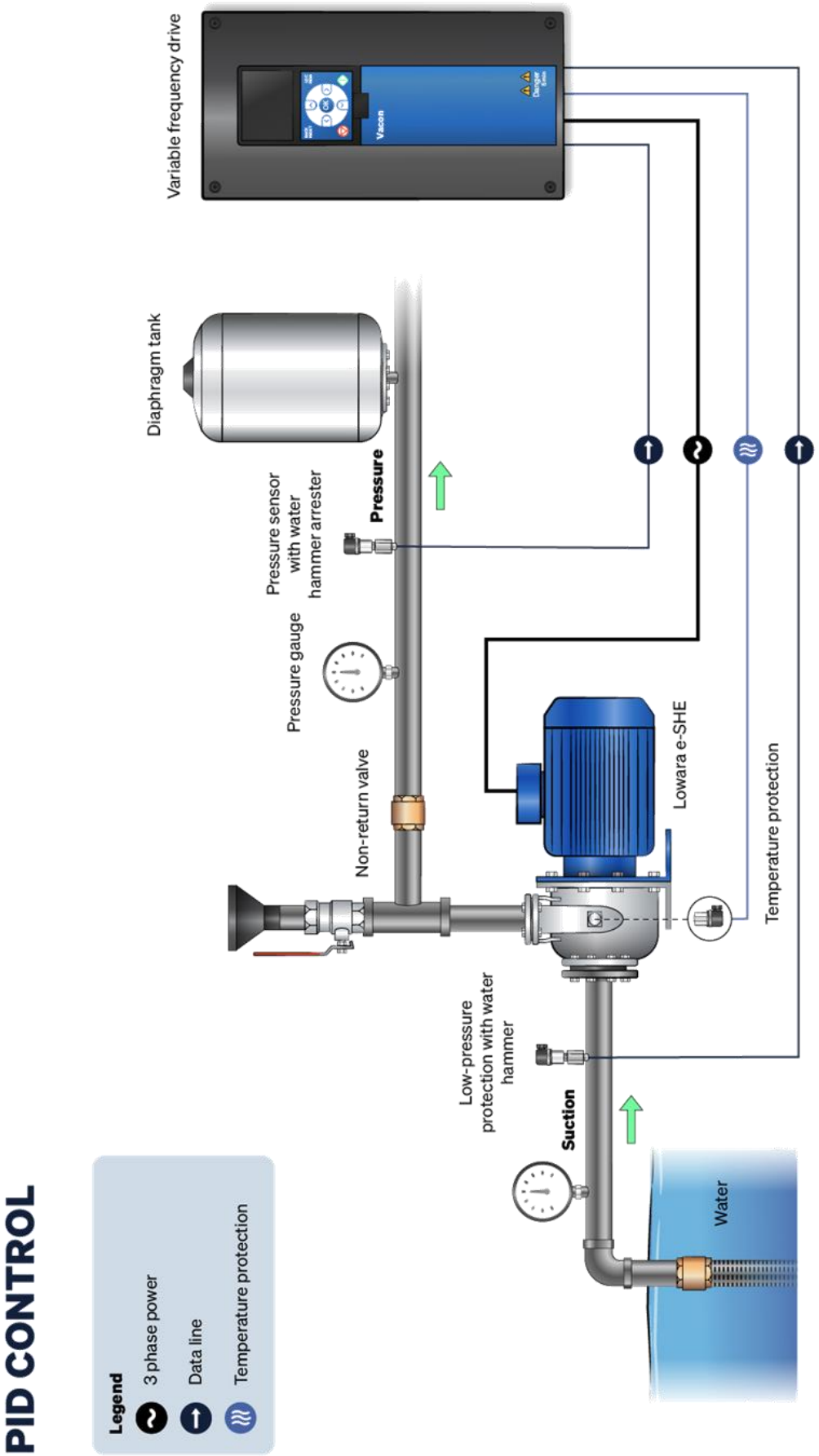
All these parameters are adjusted via the Wizard

- The 4 to 20 mA differential pressure transducer is connected to AI 2 on terminals 4 (-) and 12 (+)
- A through-connection must be made between 5 and 7.
    - Make sure that dipswitch AI2 is in the Current signal position (down).
- PID control is started by connecting 8 (DI 1) to 6 (+24 V).
- A fault can be reset remotely by connecting 10 (DI 3) to 6 (+24 V).
- To switch from target setpoint 1 to 2, connect 14 (DI 4) to 12 (+24 V).
- Fixed frequency is activated by connecting 16 (DI 6) to 12 (+24 V).

* Please note!! Terminal 6 & 12 are the same, you can interchange them.

6.2 PID hydrophore

6.2.1 Connection diagram hydrophore (P.I.D)



6.2.2 Configure application via Wizard

At the first startup, or via parameter B1.1.1, the application wizard is started.

Step	Parameter	Number	Description
1	Language Selection	P6.1	Englisch
2	Daylight saving	P5.5.5	EU
3	Time	P5.5.2	hh:mm:ss
4	Year	P5.5.4	2026
5	Date	P5.5.3	dd:mm
6	Sartup Wizard?		Yes
7	Application	P1.2	PID Control
8	Motor Type	P3.1.2.2	ReluctanceMotor, PM Motor, **Induction Motor**
9	Rated voltage	P3.1.1.1	Varies
10	Rated frequency	P3.1.1.2	50/(60) Hz.
11	Rated motor speed	P3.1.1.3	…… rpm
12	Rated motor current	P3.1.1.4	…… A
13	Cos phi of the motor	P3.1.1.5	0.3 to 1
14	Minimum frequency	P3.3.1.1	e.g. 35 Hz.6.3 Setting up pressurized water systems
15	Maximum frequency	P3.3.1.2	50/60 Hz.
16	Acceleration time	P3.4.1.2	e.g. 5 s
17	Deceleration	P3.4.1.3	e.g. 5 s
18	Application Wizard?		Yes
19	Control location		I/O - terminals
20	Selection of process unit	P3.13.1.4	Various options e.g. bar
21	Minimum process unit	P3.13.1.5	Minimum value of sensor, e.g. (0 - 10 bar) = 0 bar
22	Maximum process unit	P3.13.1.6	Maximum value of sensor, e.g. 10 bar
23	Decimal process unit	P3.13.1.7	Decimal places (0 to 0.0000)
24	Feedback 1 source selection	P3.13.3.3	Position sensor, e.g. (AI 2)
25	Signal range analogue inputs		0 to 10 V/0 to 20 mA **2 to 10 V/4 to 20 mA**
26	Inversion error	P3.13.1.8	**Normal**/inverted
27	Reference point source selection	P3.13.2.6	Reference location PID (**Keypad SP 1**)
28	Control panel reference point 1	P3.13.2.1	Fill in operating point e.g. 3 bar
29	Sleep function?		Yes
30	Sleep frequency	P3.13.5.1	e.g. 38 Hz 6.3 Setting up pressurized water systems.
31	Sleep delay 1	P3.13.5.2	e.g.30 s
32	Wake-up level	P3.13.5.3	e.g. 2,5 barRegulator starting point
33	Wizard is ready		OK

Now we can fill in the specific parameters.

6.2.3 PID control (hydrophore) parameters

Parameter group	Description	Setting
P1.2	Application	PID control
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	Ramping (pump)/Running start (fan)
P3.2.5	Stop function	Freewheel (fan)/Ramping (pump)
P3.2.6	Logic I/O A	Forward-Backward(edge) If reset error, break start contact Forward-Backward If reset error, autostart Change also P3.9.1.15 (no action)
References		
Frequency reference		
P3.3.1.1	Minimum frequency reference	... Hz*
P3.3.1.5	I/O reference A	PID
Flushing		
P3.3.6.2	Flushing frequency	... Hz if DI 6 is made (No start contact required)
I/O Configuration		
Digital inputs		
P3.5.1.1	Control signal 1 A (start clockwise)	DigIN Slot A.1
P3.5.1.4	Control signal 1 A	DigIN Slot 0.1
P3.5.1.7	Force to I/O control	DigIN Slot 0.1
P3.5.1.8	Force to I/O B reference	DigIN Slot 0.1
P3.5.1.11	External error when closed	DigIN Slot 0.1
P3.5.1.12	External error when open	DigIN Slot A.2
P3.5.1.13	Close error reset	DigIN Slot A.3
P3.5.1.31	PID Select SP 2	DigIN Slot A.4
P3.5.1.36	Flushing reference asset	DigIN Slot A.6
Analogue input 2		
P3.5.2.2.3	AI 2 signal range	2 to 10 V/4 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action
AI level low		
P3.9.8.2	Analogue input low	error
PID Regulator 1		
Basic settings		
P3.13.1.1	PID gain	200% (> the control speeds up)
P3.13.1.2	PID control I time	3 to 10 (> the control slows down)
P3.13.1.3	PID contr. D time	0 to 1 (1 > regulation lags behind)
P3.13.1.4	Selection of process unit	bar, m³/h, %, m/s etc.
P3.13.1.5	Min. process unit	minimum value sensor (reading sensor)
P3.13.1.6	Max. process unit	maximum value sensor (reading sensor)
P3.13.1.7	Decimal process unit	Readout behind decimal point (monitoring)
Reference points		
P3.13.2.1	Control panel reference point 1	Setting operating point 1 (bar)
P3.13.2.2	Control panel reference point 2	Setting operating point 2 (bar)
P3.13.2.6	Reference point source 1 selection	Control panel reference point 1
P3.13.2.10	Reference point source 2 selection	Control panel reference point 2
Feedback		
P3.13.3.3	Feedback 1 source selection	AI 2
Sleep frequency		
P3.13.5.1	Sleep frequency limit SP 1	... .Hz goes to sleep*
P3.13.5.2	Reference 1 sleep delay	….sec.
P3.13.5.3	Reference 1 wake-up level	Set start value SP 1 (bar)*
P3.13.5.7	Sleep frequency limit SP 2	... .Hz goes to sleep*
P3.13.5.8	Reference 2 sleep delay	….sec.
P3.13.5.9	Reference 2 wake-up level	Set start value SP 2 (bar)*
Feedback monitoring		
P3.13.6.1	Enable feedback monitoring	Enabled/Disabled
P3.13.6.2	Upper limit value	Enter maximum pressure (bar)
P3.13.6.3	Lower limit	Enter minimum pressure (bar)
P3.13.6.4	Delay time	…. sec.

*) For the correct adjustment of the minimum- and sleep frequency,see 6.3 Setting up pressurized water systems

All these parameters are adjusted via the Wizard

see reverse

6.2.4 PID Input pressure supervisor

With use of an extra pressure transducer e.g. (-1 to +10 bar / 4-20mA).
Can also be used with the Multi-pump Multi-drive control chapter 8.2

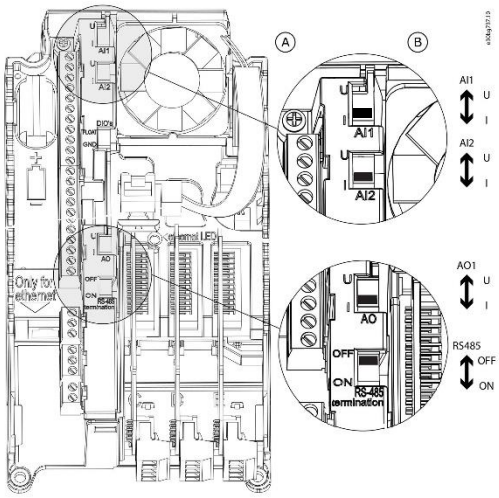
Parameter group	Description	Setting
I/O Config		
Analog input 1		
P3.5.2.1.3	AI1 signal range	2..10V / 4…20mA
PID-Controller		
Input Press.Superv.		
P3.13.9.1	Supervision Enable	Enable
P3.13.9.2	Supervision Signal	AI1
P3.13.9.3	Supervision Unit Selection	bar
P3.13.9.4	Supervision Unit Decimal	1
P3.13.9.5	Supervision Unit Min	-1,0 bar (range sensor)
P3.13.9.6	Supervision Unit Max	10,0 bar (range sensor)
P3.13.9.7	Supervision Alarm level	Input pressure Alarm e.g.(0,5 bar) Controller reports alarm but continues to run and activates reduction.
P3.13.9.8	Supervision Fault level	Input pressure Fault e.g.(-0,2 bar)
P3.13.9.9	Supervision Fault Delay	5 sec
P3.13.9.10	PID Setpoint Reduction	10%
P3.13.9.11	Setpoint reduction interpolation	Feedback
V3.13.9.12	Input Pressure Monitor	(only visible if PID is active)

The 4 to 20 mA pressure transducer is connected to AI 2 on terminals 4 (-) and 12 (+)

- A through-connection must be made between 5 and 7.
- Make sure that dipswitch AI2 is in the Current signal position (down).

The 4 to 20 mA pressure transducer for the input is connected to AI 1 on terminals 2 (-) and 12 (+)

- A through-connection must be made between 3 and 7.
- Make sure that dipswitch AI1 is in the Current signal position (down).



Location and selection of dipswitch AI1 & AI2

- PID control is started by connecting 8 (DI 1) to 6 (+24 V).
- Water thermostat (°C) or float must be connected to 9 (DI 2) and 6 (+24 V).
- A fault can be reset remotely by connecting 10 (DI 3) to 6 (+24 V).
- To switch from target setpoint 1 to 2, connect 14 (DI 4) to 12 (+24 V).
- Flushing is activated by connecting 16 (DI 6) to 12 (+24 V).

* Please note!! Terminal 6 & 12 are the same, you can interchange them.

6.3 Setting up pressurized water systems

To turn off a pressurised water system properly with a Vacon 100, a number of parameters have to be adjusted as follows:

- Set the Vacon 100 to manual (keypad).
- Set one of the monitor fields to (PID1 feedback).
- Connect the pressure line, and slowly build up the frequency to the target value P3.13.2.1 (setpoint 1) or P3.13.2.2 (setpoint 2).

Note: In an installation with inlet pressure from a silo,
make sure that the inlet pressure from the lowest level of the silo is used. In case of large differences in level and thus inlet pressure, the motor might not drop below the sleep frequency, meaning the regulator will not enter sleep mode.

Frequency in a closed pipeline and the target value	Increase sleep frequency with	Increase minimum frequency with
up to 40 Hz.	± 2.0 Hz	± 1.0 Hz
40 to 44 Hz.	± 1.5 Hz	± 0.7 Hz
44 to 47 Hz.	± 1.0 Hz	± 0.5 Hz
47 to 49 Hz.	± 0.5 Hz	± 0.2 Hz

Now fill in the resulting minimum frequency and sleep frequency according to the above table.

Example:
Frequency in a closed pipeline with target pressure 44.5 Hz
Sleep Frequency: 45.5 Hz
Minimum frequency: 45.0 Hz

If the application works with a 2nd target value, it must be ensured that the minimum frequency is linked to the lowest target value.

Make sure that the start value is always less than the target value, otherwise the Vacon 100 will never enter into sleep mode.

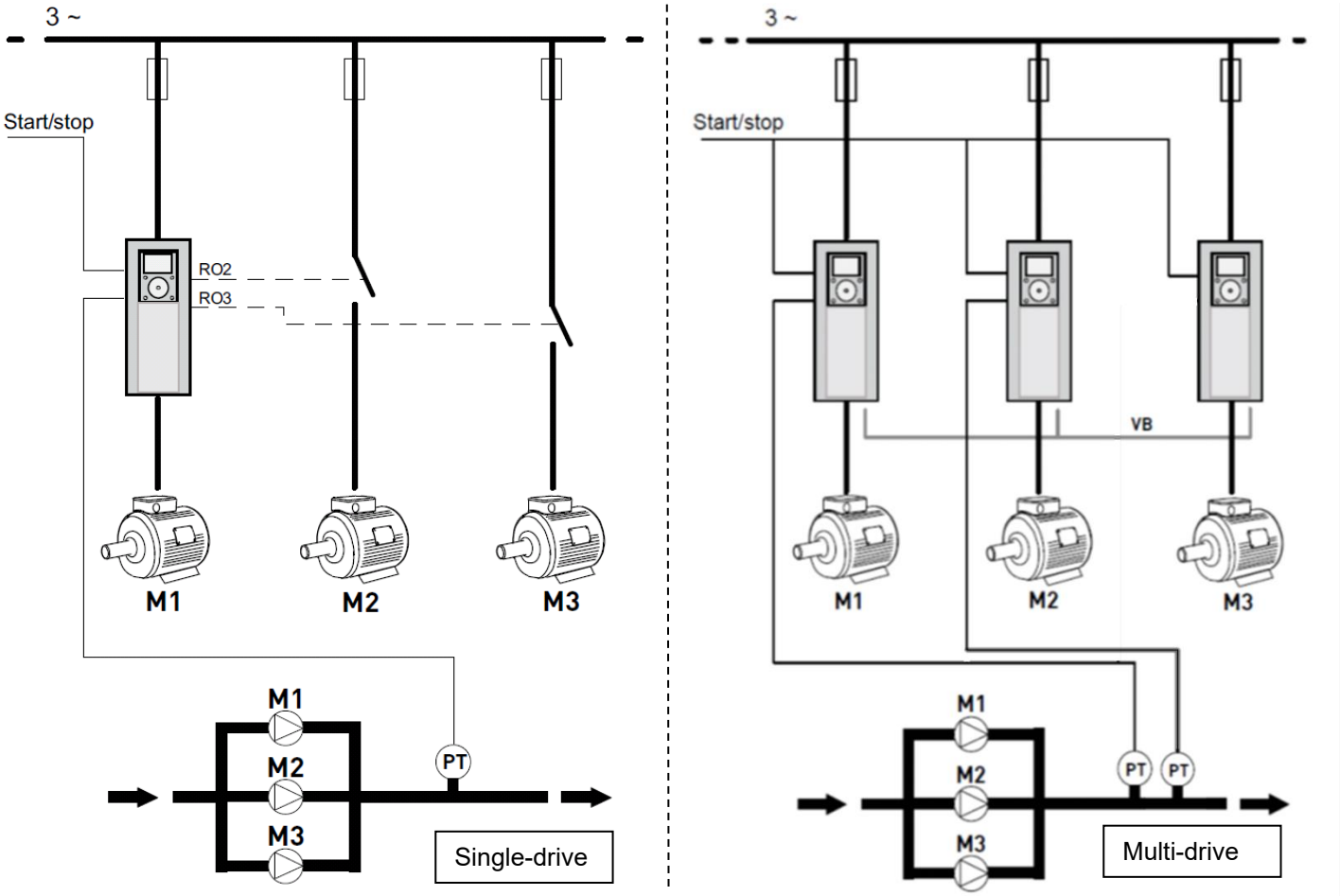
7 MULTI-PUMP

When using the application examples in this manual, you must always start from the factory settings (P6.5.1).

7.1 Multi-Pump Single Drive/Multi-Drive

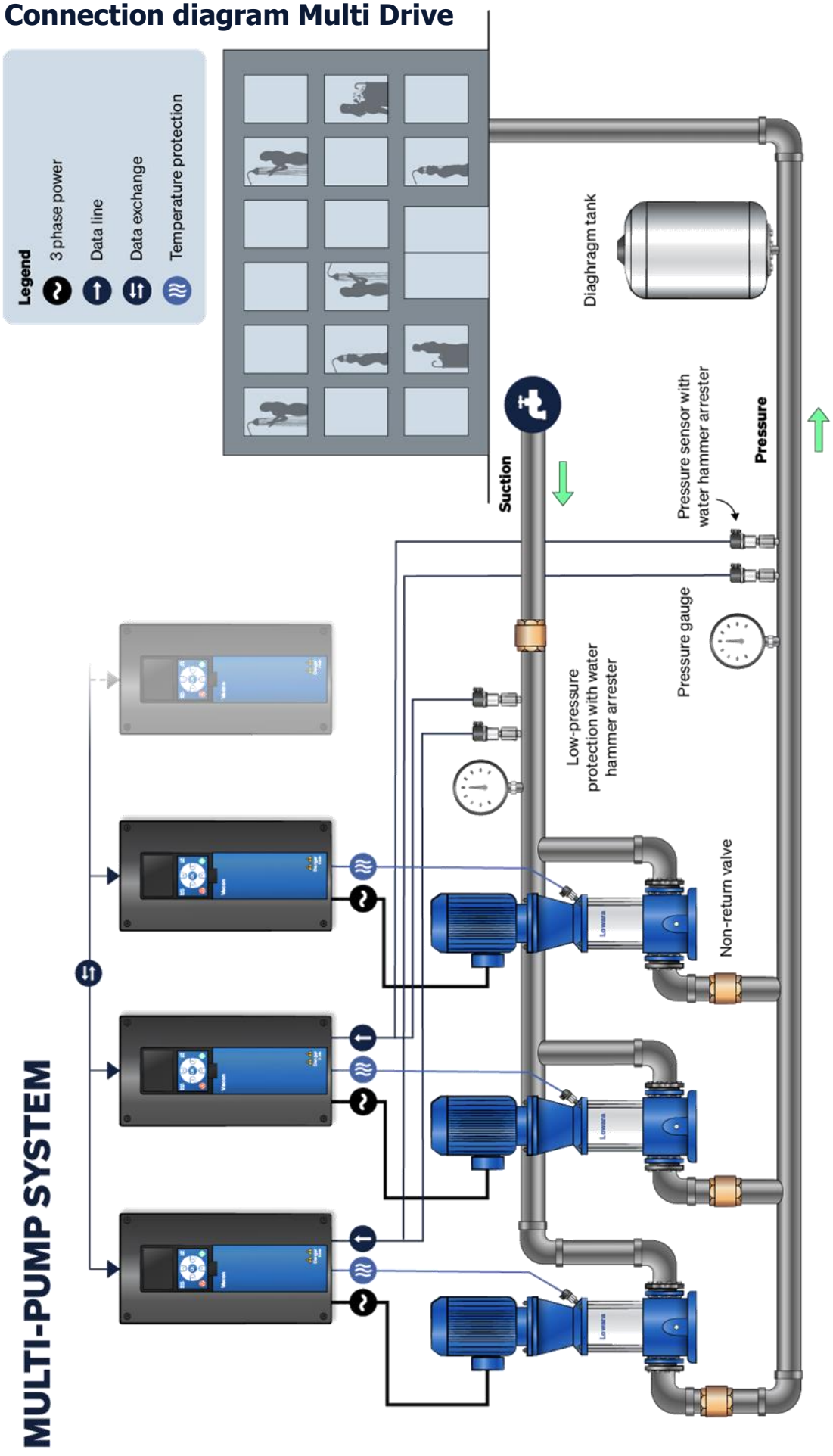
The Multi-pump application controls systems with multiple pumps.

- Single-drive is a system which can control up to 8 pumps using 1 regulator and multiple contactors/soft starters.
- Multi-drive is a system with multiple (max. 8) regulators. These keep the system pressurised via an independent communication bus.



Our advice is to provide 2 controllers with sensors for a Multi-drive control, to guarantee redundancy. The controllers that are connected with sensors must be set to “signals connected” at parameter P3.15.4.

7.2 Connection diagram Multi Drive



7.3 Multi-pump Multi-drive application (Wizard)

At the first start-up or via parameter B1.1.1, the application Wizard is started.

Step	Parameter	Number	Description
1	Language Selection	P6.1	Englisch
2	Daylight saving	P5.5.5	EU
3	Time	P5.5.2	hh:mm:ss
4	Year	P5.5.4	2026
5	Date	P5.5.3	dd:mm
6	Sartup Wizard?		Yes
7	Application	P1.2	MultiPump(MultiDrive)
8	Motor Type	P3.1.2.2	ReluctanceMotor, PM Motor, **Induction Motor**
9	Rated voltage	P3.1.1.1	Varies
10	Rated frequency	P3.1.1.2	50/(60) Hz.
11	Rated motor speed	P3.1.1.3	…… rpm
12	Rated motor current	P3.1.1.4	…… A
13	Cos phi of the motor	P3.1.1.5	0.3 to 1
14	Minimum frequency	P3.3.1.1	e.g. 35 Hz.6.3 Setting up pressurized water systems
15	Maximum frequency	P3.3.1.2	50/60 Hz.
16	Acceleration time	P3.4.1.2	e.g. 5 s
17	Deceleration	P3.4.1.3	e.g. 5 s
18	Application Wizard?		Yes
19	Control location		I/O - terminals
20	Selection of process unit	P3.13.1.4	Various options e.g. bar
21	Minimum process unit	P3.13.1.5	Minimum value of sensor, e.g. (0 - 10 bar) = 0 bar
22	Maximum process unit	P3.13.1.6	Maximum value of sensor, e.g. 10 bar
23	Decimal process unit	P3.13.1.7	e.g. 1 Decimal places (0 to 0.0000)
24	Feedback 1 source selection	P3.13.3.3	Position sensor, e.g. (AI 2)
25	Signal range analogue inputs		0 to 10 V/0 to 20 mA **2 to 10 V/4 to 20 mA**
26	Inversion error	P3.13.1.8	**Normal**/inverted
27	Reference point source selection	P3.13.2.6	Reference location PID (**Keypad SP 1**)
28	Control panel reference point 1	P3.13.2.1	Fill in operating point e.g. 3 bar
29	Sleep function?		Yes
30	Sleep frequency	P3.13.5.1	e.g. 38 Hz 6.3 Setting up pressurized water systems.
31	Sleep delay 1	P3.13.5.2	e.g.30 s
32	Wake-up level	P3.13.5.3	e.g. 2,5 barRegulator starting point
33	Multi-pump mode	P3.15.1	**Multi-follower** / Multi-master
34	Pump ID number	P3.15.3	1 to 8
35	Start and feedback	P3.15.4	Signals connected/Only start signal/Disconnected
36	Number of pumps	P3.15.2	1 to 8
37	Pump block	P3.15.5	Unused/Unblocked
38	Autochange	P3.15.6	Blocked / **Enabled (interval)** / Enabled (weekdays)
39	Autochange interval	P3.15.8	e.g. 48 h
40	Range	P3.15.13	e.g.5 %
41	Range delay	P3.15.14	e.g. 10 s
42	Wizard is ready		OK

For the drives where Signals connected is selected in step 35, go to 7.4 Multi-drive (Drives with pressure sensor) parameters

For the other drives without a sensor, go to 7.5 Multi Drive (other drivers) parameters

7.4 Multi-drive (Drives with pressure sensor) parameters

Parameter group	Description	Setting
P1.2	Application	Multi-pump (Multi-drive)
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	Current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	Ramping (pump)/Running start (fan)
P3.2.5	Stop function	Freewheel (fan)/Ramping (pump)
P3.2.6	Logic I/O A	Forward-Backward(edge) If reset error, break start contact Forward-Backward If reset error, autostart Change also P3.9.1.15 (no action)
References		
Frequency reference		
P3.3.1.1	Minimum frequency reference	... Hz*
P3.3.1.5	I/O reference A	PID
Flushing		
P3.3.6.2	Flushing reference	... Hz (Start at DI 2 requires no start contact)
I/O Configuration		
Digital inputs		
P3.5.1.1	Control signal 1 A (start clockwise)	DigIN Slot A.1
P3.5.1.11	External error when closed	DigIN Slot 0.1
P3.5.1.12	External error when open	DigIN Slot A.6
P3.5.1.13	Close error reset	DigIN Slot A.4
P3.5.1.31	PID Select SP 2	DigIN Slot A.3
P3.5.1.36	Activation flushing reference	DigIN Slot A.2
Analogue input 2		
P3.5.2.2.3	AI 2 signal range	2 to 10 V/4 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action
AI level low		
P3.9.8.2	Analogue input low	error
PID Regulator 1		
Basic settings		
P3.13.1.1	PID gain	200% (> the control speeds up)
P3.13.1.2	PID control I time	3 to 10 (> the control slows down)
P3.13.1.3	PID control D time	0 to 1 (1 > regulation lags behind)
P3.13.1.4	Selection of process unit	bar, m³/h, %, m/s etc.
P3.13.1.5	Min. process unit	minimum value sensor (reading sensor)
P3.13.1.6	Max. process unit	maximum value sensor (reading sensor)
P3.13.1.7	Decimal process unit	Readout behind decimal point (monitoring)
Reference points		
P3.13.2.1	Control panel reference point 1	Setting operating point 1 (bar)
P3.13.2.2	Control panel reference point 2	Setting operating point 2 (bar)
P3.13.2.6	Reference point source 1 selection	Control panel reference point 1
P3.13.2.10	Reference point source 2 selection	Control panel reference point 2
Feedback		
P3.13.3.3	Feedback 1 source selection	AI 2
Sleep frequency		
P3.13.5.1	Sleep frequency limit SP 1	... .Hz goes to sleep*
P3.13.5.2	Reference 1 sleep delay	….sec.
P3.13.5.3	Reference 1 wake-up level	Set start value SP 1 (bar)*
P3.13.5.7	Sleep frequency limit SP 2	... .Hz goes to sleep*
P3.13.5.8	Reference 2 sleep delay	….sec.
P3.13.5.9	Reference 2 wake-up level	Set start value SP 2 (bar)*
Feedback monitoring		
P3.13.6.1	Enable feedback monitoring	Enabled/Disabled
P3.13.6.2	Upper limit value	Enter maximum pressure (bar)
P3.13.6.3	Lower limit	Enter minimum pressure (bar)
P3.13.6.4	Delay time	…. sec.

Parameter group	Description	Setting
Multi-pump		
P3.15.1	Multi-pump mode	Multi-follower (synchronous control) Multi-master (1 pump regulated) Note!: this parameter must be the same with all drives
P3.15.2	Number of pumps	1 to 8
P3.15.3	Pump ID number	1 to 8
P3.15.4	Start and feedback	Signals connected
P3.15.5	Pump block	**Not used**/Release
P3.15.6	Autochange mode	Blocked **Enabled (interval)** Enabled (weekdays)
P3.15.7	Autochange pumps	Auxiliary pumps/**all pumps**
P3.15.8	Autochange interval	0 to 3,000 h
P3.15.9	Autochange days	Sunday to Saturday
P3.15.10	Autochange time	00:00:00 to 23:59:59
P3.15.11	Autochange frequency limit	50 Hz.
P3.15.12	Autochange pump limit	Max. number of pumps
P3.15.13	Range	e.g. 5 % determined when pumps are switched on
P3.15.14	Range delay	10 s
P3.15.15	Constant production speed	100%
Advanced Settings		
P3.15.22.1	Staging Frequency	Frequency when auxiliary motor will be started
P3.15.22.2	De-Staging Frequency	Frequency when auxiliary motor will be stoped
P3.15.22.3	Staging Delay	Start delay auxiliary motor
P3.15.22.4	De-Staging Delay	Stop delay auxiliary motor

*) For the correct adjustment of the minimum- and sleep frequency,see 6.3 Setting up pressurized water systems
All these parameters are adjusted via the Wizard

7.4.1 Input pressure supervision optional

With use of an extra pressure transducer e.g. (-1 to +10 bar / 4-20mA).
Please note! If you want to apply the suction protection, each controller must be equipped with a sensor that is programmed in parameter P3.15.4 to “signals connected”

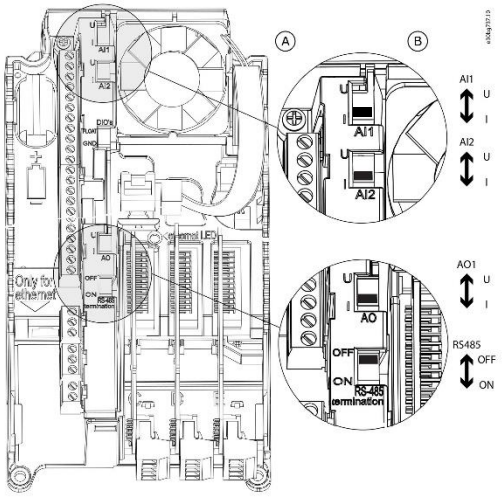
Parameter group	Description	Setting
I/O Config		
Analog input 1		
P3.5.2.1.3	AI1 signal range	2..10V / 4…20mA
PID-Controller		
Input Press.Superv.		
P3.13.9.1	Supervision Enable	Enable
P3.13.9.2	Supervision Signal	AI1
P3.13.9.3	Supervision Unit Selection	bar
P3.13.9.4	Supervision Unit Decimal	1
P3.13.9.5	Supervision Unit Min	-1,0 bar (range sensor)
P3.13.9.6	Supervision Unit Max	10,0 bar (range sensor)
P3.13.9.7	Supervision Alarm level	Input pressure Alarm e.g.(0,5 bar) Controller reports alarm but continues to run and activates reduction.
P3.13.9.8	Supervision Fault level	Input pressure Fault e.g.(-0,2 bar)
P3.13.9.9	Supervision Fault Delay	5 sec
P3.13.9.10	PID Setpoint Reduction	10%
P3.13.9.11	Setpoint reduction interpolation	Feedback
V3.13.9.12	Input Pressure Monitor	(only visible if PID is active)

see reverse

- The 4 to 20 mA pressure transducer is connected to AI 2, to the 4 (-) and 12 (+) terminals
- A through-connection must be made between 5 and 7.
- Make sure that dipswitch AI 2 is in the Current signal position (down).

- The 4 to 20 mA pressure transducer for the input is connected to AI 1 on terminals 2 (-) and 12 (+)
- A through-connection must be made between 3 and 7.
- Make sure that dipswitch AI1 is in the Current signal position (down).

- PID control is started by connecting 8 (DI 1) to 6 (+24 V).
- Flushing is activated by connecting 9 (DI 2) to 6 (+24 V).
- To switch from target value 1 to 2, connect 10 (DI 3) with 6 (+24 V)
- A fault can be reset remotely by connecting 14 (DI 4) with 12 (+24 V).
- Water thermostat (°C) or float must be connected to 16 (DI 6) and 12 (+24 V).
- Connect A and B (RS-485) of the various regulators with each other.
- At the first and last connected regulators, make sure that the RS-485 bus termination dipswitches are set to ON: all others should be set to OFF



Location and selection AI 2 dip switch and RS-485 bus termination

* Please note!! Terminal 6 & 12 are the same, you can interchange them.

For wiring diagrams, refer to:
https://www.vanderendegroup.com/product/danfoss-vacon-100-flow-O062-flow

7.5 Multi Drive (other drivers) parameters

Parameter group	Description	Setting
P1.2	Application	Multi-pump (Multi-drive)
Motor settings		
Motor control		
P3.1.2.3	Internal switching frequency	Modification if excessive motor noise
P3.1.2.4	Identification	Ad stand still (start within 30 sec)
Motor limits		
P3.1.3.1	Current limit	Maximum permissible motor current ± 1.4x In
Start/Stop Settings		
P3.2.4	Start function	Ramping (pump)/Running start (fan)
P3.2.5	Stop function	Freewheel (fan)/Ramping (pump)
P3.2.6	Logic I/O A	Forward-Backward(edge) If reset error, break start contact Forward-Backward If reset error, autostart Change also P3.9.1.15 (no action)
I/O Configuration		
Digital inputs		
P3.5.1.1	Control signal 1 A (start clockwise)	DigIN Slot A.1
P3.5.1.11	External error when closed	DigIN Slot 0.1
P3.5.1.12	External error when open	DigIN Slot A.6
P3.5.1.13	Close error reset	DigIN Slot A.4
Analogue input 2		
P3.5.2.2.3	AI 2 signal range	2 to 10 V/4 to 20 mA
Protections		
Motor thermal protection		
P3.9.2.1	Calculated motor thermal protection	no action
AI level low		
P3.9.8.2	Analogue input low	error
Multi-pump		
P3.15.1	Multi-pump mode	Single drive Multi-follower (synchronous control) Multi-master (1 pump regulated)
P3.15.2	Number of pumps	1 to 8
P3.15.3	Pump ID number	1 to 8
P3.15.4	Start and feedback	**Only start signal** / Not connected
P3.15.5	Pump block	**Not used** / Release
P3.15.6	Autochange mode	Blocked **Enabled (interval)** Enabled (weekdays)
P3.15.7	Autochange pumps	Auxiliary pumps/**all pumps**
P3.15.8	Autochange interval	e.g. 48 h
P3.15.9	Autochange days	Sunday to Saturday
P3.15.10	Autochange time	00:00:00 to 23:59:59
P3.15.11	Autochange frequency limit	50 Hz.
P3.15.12	Autochange pump limit	Max. number of pumps
P3.15.13	Range	5 % determined when pumps are switched on
P3.15.14	Range delay	10 s
P3.15.15	Constant production speed	100%

All these parameters are adjusted via the Wizard

- PID control is started by connecting 8 (DI 1) to 6 (+24 V).
- A fault can be reset remotely by connecting 14 (DI 4) with 12 (+24 V).
- Water thermostat (°C) or float must be connected to 16 (DI 6) and 12 (+24 V).
- Connect A and B (RS-485) of the various regulators with each other.
- At the first and last connected regulators, make sure that the RS-485 bus termination dipswitches are set to ON: all others should be set to OFF (fore position see previous page)

* Please note!! Terminal 6 & 12 are the same, you can interchange them.

For wiring diagrams, refer to:
https://www.vanderendegroup.com/product/danfoss-vacon-100-flow-O062-flow

7.6 Adjust Multi-pump running time

Which pump is controlled during a change is determined by the pump's running time. This makes it important that the running time is set the same when replacing the drive.

Parameter group	Description	Setting
Multi-pump		
Pump running time		
P3.15.19.1	Set run time counter	Confirming set run time
P3.15.19.2	Set run time: value	Time in hours
P3.15.19.3	Set run time: pump	Select all or a specific pump
P3.15.19.4	Run time alarm limit	Alarm status
P3.15.19.5	Run time fault limit	Fault status (drive will stop)

With parameters V2.10.7 to 14 you can monitor the running time of the different pumps.

8 NOTES

The parameters listed in this booklet are merely examples from which no rights can be derived.

Aartsdijkweg 23, 2676 LE Maasdijk, The Netherlands
+31 174 51 50 50 · info@vanderendegroup.com · www.vanderendegroup.com