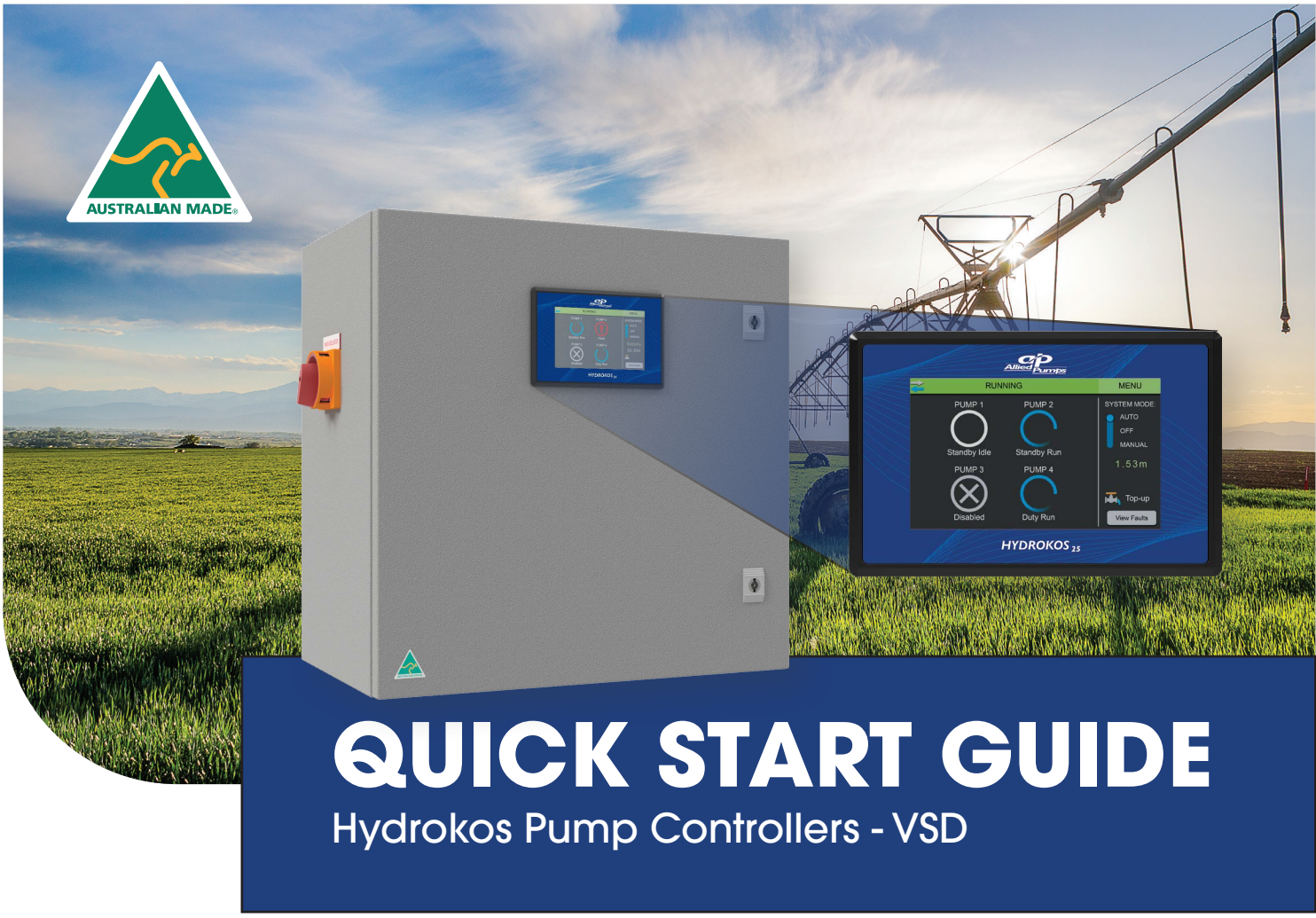


QUICK START GUIDE

Hydrokos Pump Controllers - VSD

The Hydrokos Controller has been designed with ease of use at the core of the system design. Building on the wealth of the pump control features in the Advanced controller, the Hydrokos brings these features into a new age with a color touch screen interface and a streamlined setup process. In a world where information is power the Hydrokos has extensive time and date stamped alarms, logged data, trend graphs and diagnostic pages to provide the user with all the information required for optimisation and preventative maintenance. Featuring the flexibility of level, pressure and temperature system modes with a wide range of functions and protections, the Hydrokos VSD controller is ideal for a wide range of applications including water transfer, stormwater and sewage pump out, constant pressure, hot water circulation and chiller supply, to name a few.
For more information on the operation of the Hydrokos VSD controller see the Hydrokos VSD Operation Manual.

SAFETY

This control panel has been designed and built for applications that are Commercial and/or Industrial in nature, operation, function and location. If the control panel is to be used in Domestic/Residential applications, where specific Wiring Rules in respect of 'electrical supply' protection may apply, it is the responsibility of the installing electrician to ensure compliance with relevant standards.

- Prior to installation, ensure power supply is isolated.
- Power supply must be circuit breaker protected (qualified electrician to determine appropriate amp rating).
- **It is highly recommended that RCDs are NOT used to protect the supply to this panel. The VSDs in this panel have EMC filtering which can cause nuisance tripping of RCDs. It is recommended to use alternative protection for the incoming cables. If RCDs are required, type B RCDs must be used, taking into consideration the VSD earth leakage current to avoid nuisance tripping.**
- Electrical connection to the panel must be carried out in accordance with the following pages.
- Additions or modifications to the control panel are not permitted and will void warranty.
- The controller is not intended for use by children or infirm persons without supervision.
- Repairs to the controller must only be carried out by a suitably qualified electrician.

This manual makes use of the following symbols to indicate warnings that must be paid specific attention to:

This quick start guide makes use of the following symbols to indicate warnings that must be paid specific attention to:

Damage to equipment or personal harm may occur if this instruction is not followed

Electrical risk (electrocution hazard) may occur if this instruction is not followed

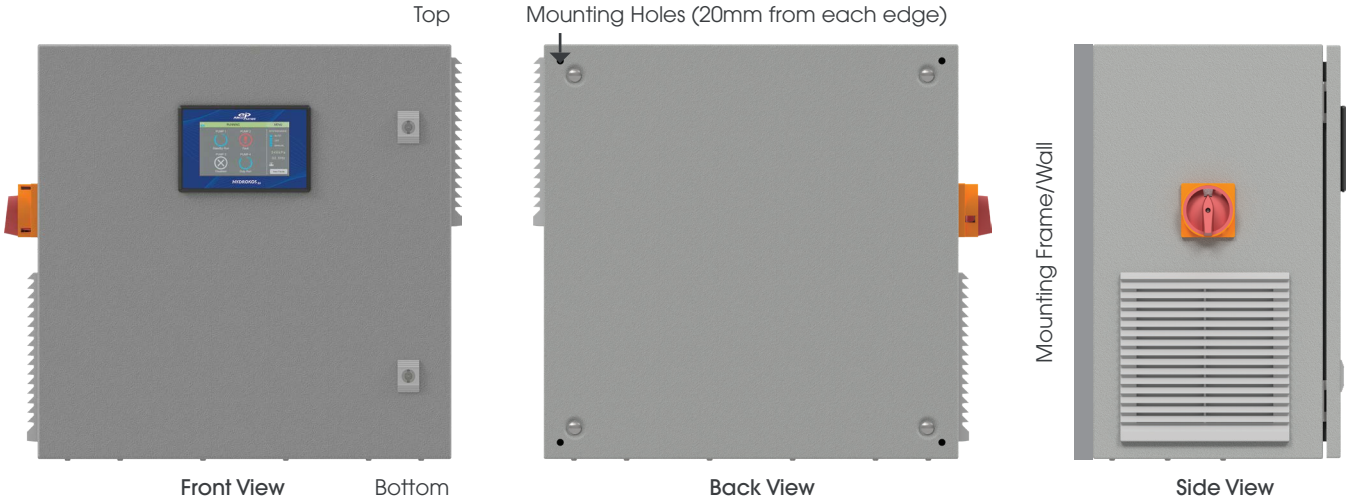
HARMONIC CONSIDERATION

With all variable speed drives there will be some harmonic distortion on the main power supply. The drives used in the Hydrokos VSD have internal filters to reduce the amount of distortion, however in some applications additional filtering may be required. If additional harmonic filtering is required to meet site specifications this can be requested. See below an excerpt from the Australian Standard AS/NZS 61000.3.6 "Limits - Assessment of emission limits for distorting loads in MV and HV power systems":

'Power utility companies and Australian Standards stipulate maximum harmonic levels which apply at a customer's PCC (point of common coupling). Generally, the maximum permissible harmonic levels are given in terms of % THVD however to achieve a reduction in THVD, the customer is required to reduce their THID through the use of harmonic mitigation equipment. Commonly, THVD levels are required to be between 5-8%, however this will vary from state to state. IEEE STD 519 (1992) and AS/NZS 61000.3.6 (2001) are two widely used harmonic limit standards, however other standards may also be relevant including AS/NZS 61000.3.2 2007. Please confirm harmonic requirements with your utility provider. For more information please refer to the relevant standard.'

INSTALLATION

- Controller enclosure must be mounted in a vertical position.
- Ensure mounting method does not compromise enclosure weatherproof rating.
- Ensure access to main isolator is not restricted.
- Ensure cables/conduits entering the panel have mechanical protection and that the penetrations are sealed and do not compromise the weatherproof rating of the enclosure.



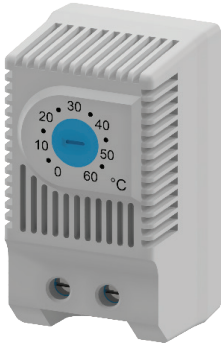
CONNECTIONS

Warning: All electrical connections must be carried out by a suitably qualified and registered electrician

Follow the relevant controller's **Inner Door Label** on the inside of the enclosure door for power, pump and sensor connections to the din rail mount terminals.

ADJUST FAN THERMOSTAT

Adjust the thermostat that controls the cabinet fan to a temperature suitable for the ambient temperature and environment the controller is installed in. A recommended setting would be around 25-30°C.



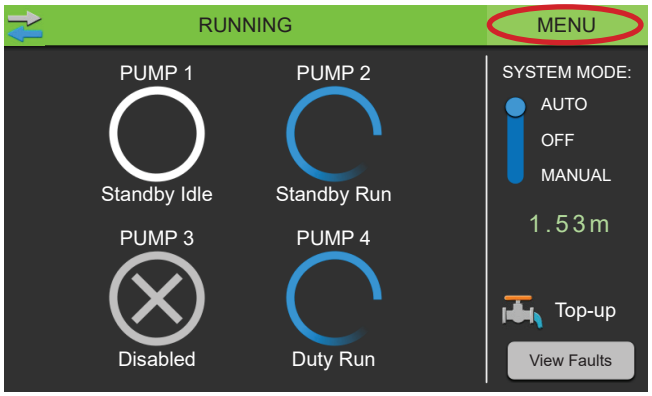
POWERUP

When safe to do so, switch on electrical supply to panel. Check correct supply voltage before turning on the main isolator.

SETUP

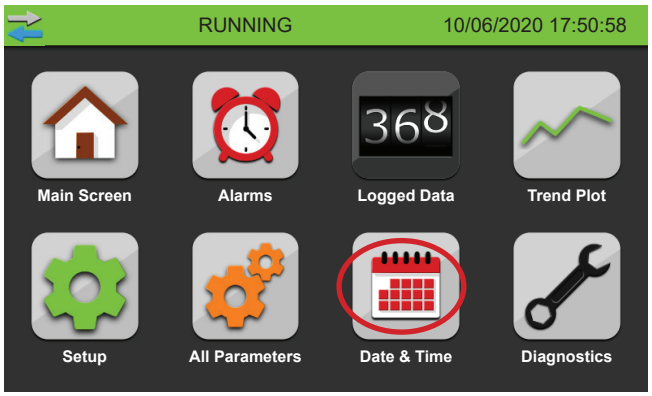
1 - MAIN SCREEN

The Main screen is the default screen on the Hydrokos HMI. Tap on the Menu button to access the Menu screen.



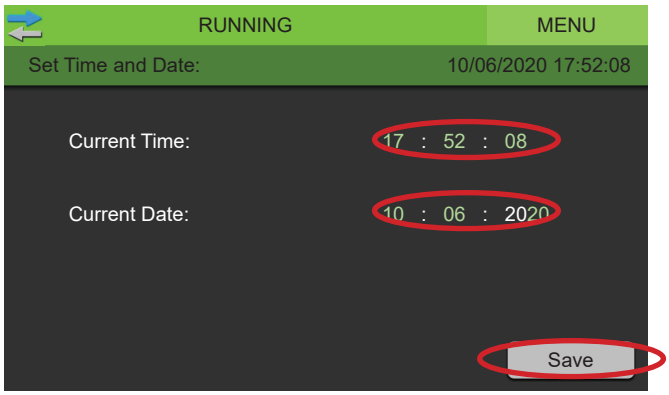
2 - MENU SCREEN

The Menu screen provides access to other screens within the Hydrokos HMI. Tap on the Date & Time icon to configure the controller's current date and time.



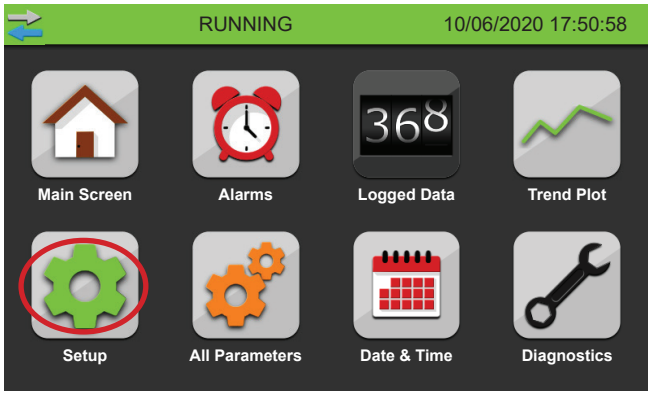
3 - SET DATE & TIME

Tap on the date and time to configure them, then press save to apply to the controller. This will automatically return to menu.



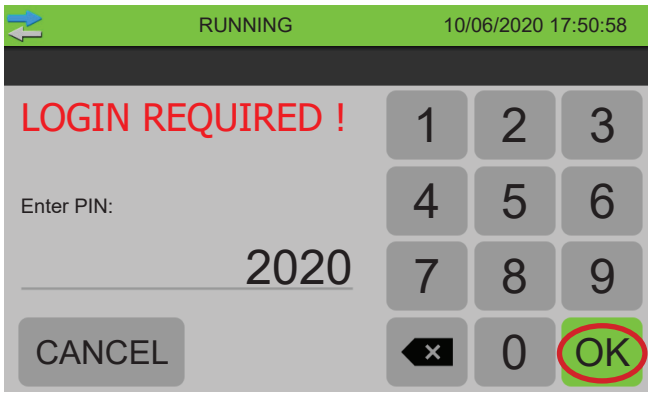
4 - MENU SCREEN

Tap on the Setup icon on the Menu screen to access begin the controller Setup process. This will bring up the Login screen.



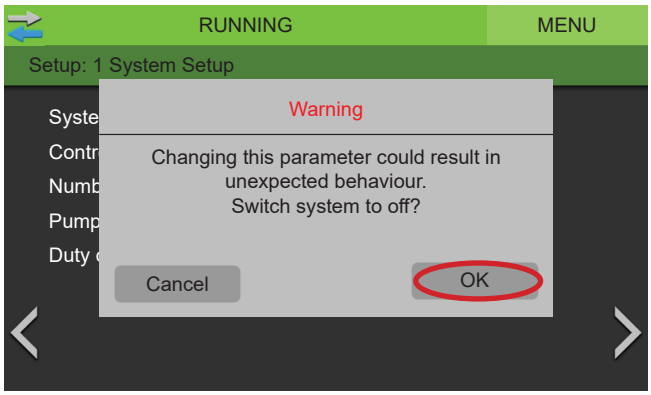
5 - LOGIN

Login is required to access the Setup screen. Enter the default PIN (2020) then press OK to login in and continue to the Setup screen.



6 - WARNING

If the system mode is in auto, tapping on a setting will bring up a Warning screen. Press OK to turn the system off for configuration.



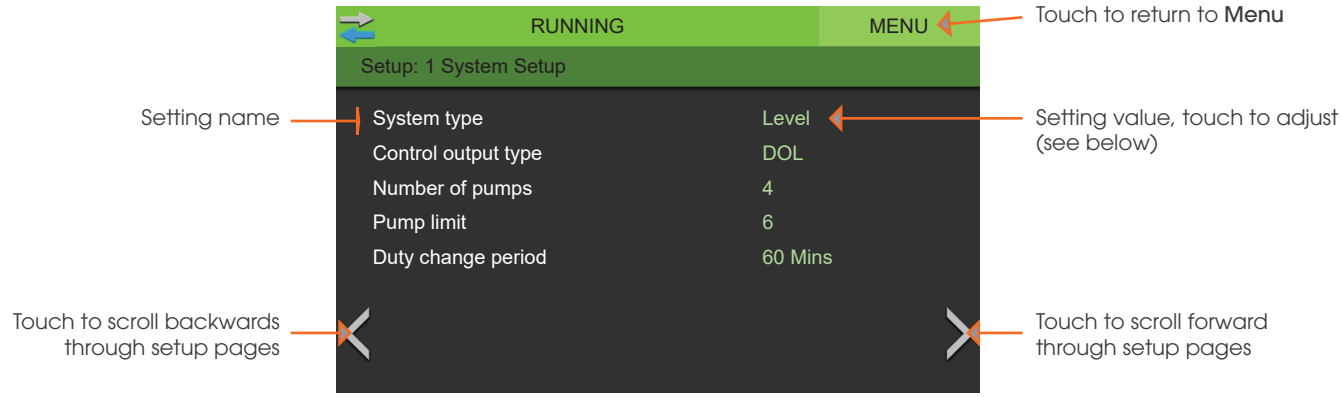
SETUP

The Setup Screen is where the controller is configured for operation.

The pages following the System Setup page will change depending on whether the 'Level', 'Pressure' or 'Temperature' *system type* is selected, allowing users to adjust settings that are specific to that application.

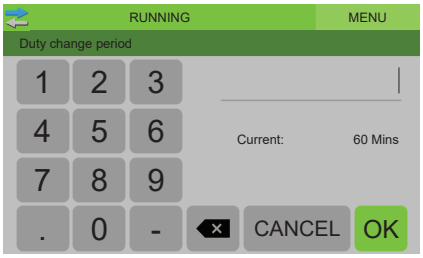
All user adjusted settings can be recorded on the last page of this guide.

SETUP SCREEN OPERATION



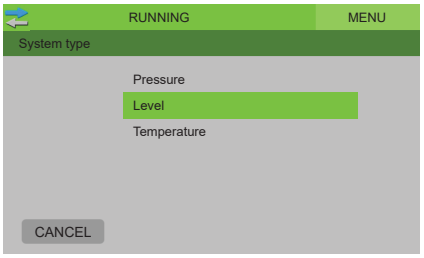
Setting Adjustment - Value

If a value setting, such as *Duty change period,* is pressed on, the keyboard screen will appear and the desired value can be entered or the process cancelled.



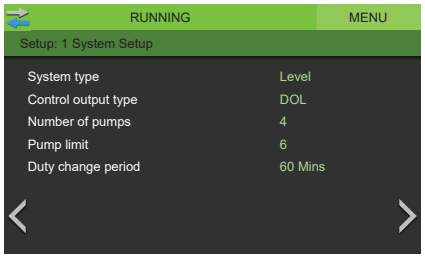
Setting Adjustment - Selection

If a selection setting, such as *System type,* is pressed on, a drop down list of all the available options for the setting will appear and the desired option can be selected or the process cancelled.



7 - SYSTEM SETUP

The main setup for the system and pump control method.

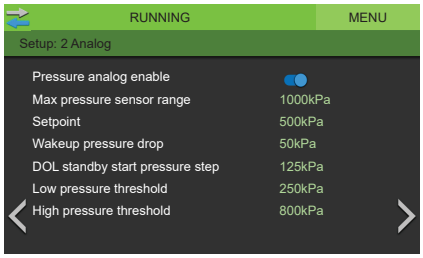


System type	Sets default system settings for the pressure, level or temperature system types.
Control output type	Sets default system settings for the DOL, Soft start or VSD controlled pumps. This setting is factory set and does not require adjustment.
Number of pumps	Total number of pumps connected which configures the display and pump selection. This setting is factory set and does not require adjustment.
Pump limit	Maximum number pumps to be running at the same time. Used to limit max flow or max power requirements.

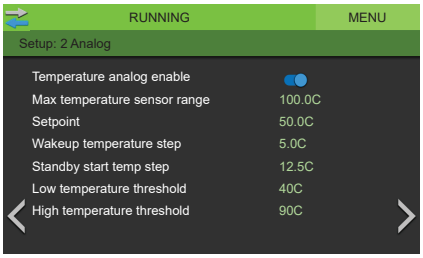
8 - ANALOG

The analog setup if using the analog input for a transducer. This must be used for correct VSD operation.

Level Control



Pressure Control



Temperature Control

Level

Level analog enable	If enabled the analog input will be used in conjunction with the digital inputs for level control and alarms.
Max level sensor range	The maximum range of the analog level sensor used.
Setpoint stop level	Target *Setpoint stop level* to be reached by the system.
Wakeup level step	The analog level step from the *setpoint stop level* before the system will wake from sleep and start the duty pump. For example, in a level empty application, if the *setpoint stop level* = 0.5m and *wakeup level step* = 0.2m, the duty pump will start at 0.5m + 0.2m = 0.7m.
Standby start level step	The analog level steps from the *wakeup level step* at which the standby pumps start. Following on from the above example, if the *standby start level step* = 0.5m, the 1st standby pump will start at 0.5m + 0.2m + 0.5m = 1.2m. The 2nd standby pump will start after another 0.5m step, therefore at 1.7m, and so on for any additional standby pumps.
Low level threshold	When the analog goes below this threshold for 3 seconds the *Low level protection* will be activated.
High level threshold	When the analog goes above this threshold for 3 seconds the *High level protection* will be activated.

Pressure

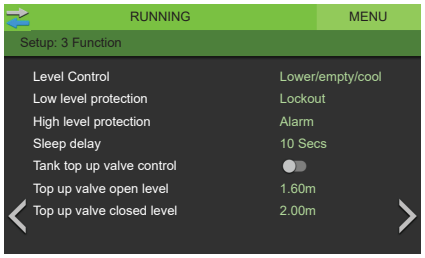
Pressure analog enable	If enabled the analog input will be used as well as the digital inputs for the pressure control and alarms.
Max pressure sensor range	The maximum range of the analog pressure sensor used.
Setpoint	Target *Setpoint* to be reached by the system.
Wakeup pressure drop	The analog pressure step below the *setpoint* before the system will wake from sleep and start the duty pump. For example, if the *setpoint* = 500kPa and the *wakeup pressure drop* = 50kPa, the duty pump will start at 500kPa - 50kPa = 450kPa.
DOL Standby start pressure step	The analog pressure steps below the *Wakeup pressure drop* at which the standby pumps start. Following on from the above example, if the *DOL standby start pressure step* = 100kPa, the 1st standby pump will start at 500kPa - 50kPa - 100kPa = 350kPa. The 2nd standby pump will start after another 100kPa drop, therefore at 250kPa.
Low pressure threshold	While a pump is running if the analog goes below this threshold for 30 seconds the *Low pressure protection* will be activated.

Temperature

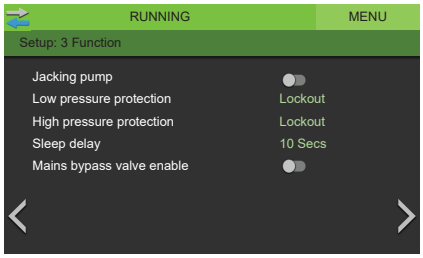
Temperature analog enable	If enabled the analog input will be used in conjunction with the digital inputs for the temperature control and alarms.
Max temperature sensor range	The maximum range of the analog level sensor used.
Setpoint	Target *Setpoint* to be reached by the system.
Wakeup temperature step	The analog temperature step from the *Setpoint* before the system will wake from sleep and start the duty pump.
Standby start temp step	The analog temperature steps from the *Wakeup temperature step* at which the standby pumps start.
Low temperature threshold	When the analog goes below this threshold for 3 seconds the *Low temperature protection* will be activated.

9 - FUNCTION

The functional setup for the system.



Level Control



Pressure Control

Temperature Control

Level

Level control	Sets the control direction for the corresponding *System type*. Level = empty/fill
Low level protection	Alarm = Triggers alarm only, Lockout = Triggers an alarm and shuts down the pumps, Inhibit = Shuts down the pumps only. All modes will auto reset when condition clears.
High level protection	Alarm = Triggers alarm only, Lockout = Triggers an alarm and shuts down the pumps, Inhibit = Shuts down the pumps only. All modes will auto reset when condition clears.
Sleep delay	The delay once the analog *Setpoint* is reached and all pump start inputs are open before the pumps will go to sleep.
Tank top up valve enable	If enabled the valve output will be used for a normally closed tank top up valve using the *Tank top up valve open level* and *Tank top up valve closed level*. **Note -** This feature is available upon request. Not available on the CS version of the Hydrokos.
Top up valve open level	The analog level at which the valve output will be energised to open the valve. Must be below the *Tank top up valve closed level*.
Top up valve closed level	The analog level at which the valve output will be de-energised to close the valve. Must be above the *Tank top up valve open level*.

Pressure

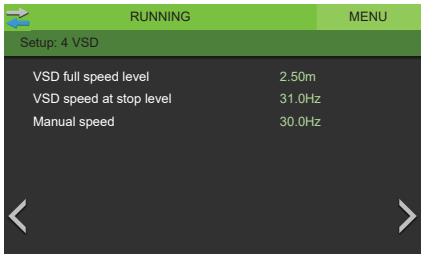
Jacking pump	If enabled jacking pump 1 will always be the first to wake from sleep. When it can't keep up with demand, one of the main pumps will start and the jacking pump will switch off after 10 seconds.
Low pressure protection	Alarm = Triggers alarm only, Lockout = Triggers an alarm and shuts down the pumps, Inhibit = Shuts down the pumps only and waits 60 seconds before auto restart. 5 failed restarts will active a lockout.
High pressure protection	Alarm = Triggers alarm only, Lockout = Triggers an alarm and shuts down the pumps, Inhibit = Shuts down the pumps only. All modes will auto reset when condition clears.
Sleep delay	The delay once the analog *Setpoint* is reached and/or all pump start inputs are open before the pumps will go to sleep.
Mains bypass valve enable	If enabled, the valve output will be used for a normally open mains bypass valve, energising it shut during normal operation and de-energising the valve open on digital low level, system off, disabled or lockout. **Note -** This feature is available as standard on the Hydrokos RMC version.

Temperature

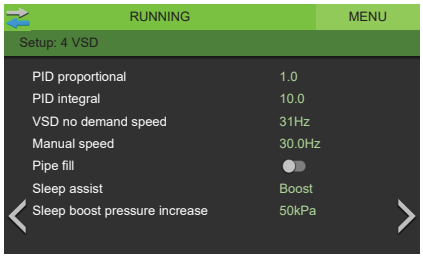
Temperature control	Sets the control direction for the corresponding *System type*. Temperature = cool/heat
Low temperature protection	Alarm = Triggers alarm only, Lockout = Triggers an alarm and shuts down the pumps, Inhibit = Shuts down the pumps only. All modes will auto reset when condition clears.
High temperature protection	Alarm = Triggers alarm only, Lockout = Triggers an alarm and shuts down the pumps, Inhibit = Shuts down the pumps only. All modes will auto reset when condition clears.
Sleep mode	None = System won't sleep, always at least 1 pump running, Setpoint based = System will go to sleep after the *sleep delay* when the analog *Setpoint* has been reached and/or all digital start inputs are open. Speed based = Not applicable in temperature operation.
Sleep delay	If *Sleep mode* = Setpoint based, this is the delay once the analog *Setpoint* is reached and/or all pump start inputs are open before the pumps will go to sleep.

10 - VSD

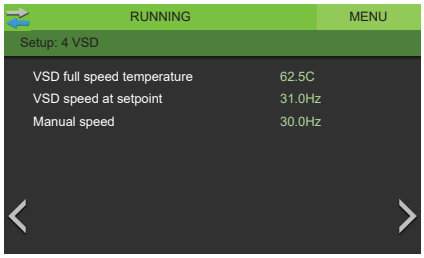
The VSD setup for proportional or PID speed control if the output type is set to VSD.



Level Control



Pressure Control



Temperature Control

Level

VSD full speed level	This is the analog level at which all the pumps will be running at full speed. Ensure that it is set lower than the *setpoint* if the *control direction* = 'Fill' and higher than the setpoint if the *control direction* = 'Empty'.
VSD speed at stop level	This is the speed the pumps will be running at when at the *setpoint* stop level.
Manual speed	This is the speed a VSD controlled pump will run in manual. If the system is in auto and a duty or standby pump is running then the auto speed will override the *manual speed*.

Pressure

PID Proportional	Proportional is the controlled speed response based on the analog feedback distance from *setpoint* when configured for pressure VSD. 'Increase' = More responsive, 'Decrease' = Less responsive. **See next page for more information on setting the PID.**
PID Integral	Integral is the controlled speed response based on the analog feedback time from *setpoint* when configured for pressure VSD. 'Increase' = Slower response, 'Decrease' = Faster response. **See next page for more information on setting the PID.**
VSD No demand speed	Once the pump speed has dropped below the *No demand speed* for the *Sleep delay* the system will go to sleep. **See next page for more information on setting the *No demand speed*.**
Manual speed	This is the speed a VSD controlled pump will run in manual. If the system is in auto and a duty or standby pump is running then the auto speed will override the *manual speed*.
Pipe fill	If enabled, when the system wakes up from sleep and the analog pressure is more than 20% of the transducer range below *setpoint* the system will run a single duty pump at 45Hz to increase the pressure slowly. If the pump fails to increase pressure to less than 20% of the transducer range from *setpoint* in 10 minutes a pipe fill fault will lockout the pumps.
Sleep assist	When the pump speed is not varying more than 0.1Hz for 20 seconds the system will initiate one of the following sleep assist modes if selected. 'Speed minimise' will slowly drop the pump speed to try and reach the *No demand speed*. If the pressure drops from *setpoint* the system will resume normal running. 'Boost' will temporarily adjust the *setpoint* to *setpoint* + *sleep boost pressure* increase to increase the system pressure, before returning to the normal running and *setpoint*. This should slow the pump speed to below the *No demand speed* if there is no system demand.
Sleep boost pressure increase	This is the target pressure above the *setpoint* which the sleep boost will try and reach before returning to normal operation.

Temperature

VSD full speed temperature	This is the analog temperature at which all the pumps will be running at full speed. Ensure that it is set lower than the *setpoint* if the *control direction* = 'Heat' and higher than the *setpoint* if the *control direction* = 'Cool'.
VSD speed at setpoint	This is the speed the pumps will be running at when at the *setpoint*.
Manual speed	This is the speed a VSD controlled pump will run in manual. If the system is in auto and a duty or standby pump is running then the auto speed will override the *manual speed*.

11 - ADDITIONAL INFORMATION FOR SETTING THE PID

The PID algorithm is used to control the speed of the pumps in the pressure VSD configuration to maintain a stable *setpoint*. Generally larger pumps will need to have a slower PID response to smaller pumps. Care must be taken adjusting these values as they can cause the system to become unstable. Also if the VSD acceleration and deceleration times are too large these delays can cause the system pressure to oscillate. It is best to keep the VSD acceleration and deceleration as quick as possible without causing drive high DC bus faults. Below are some tips to setting the PID:

- ***Proportional*** - Increasing the proportional will increase the speed of the PID causing quicker response accelerating and decelerating. Too fast or too slow can cause system pressure over shoot. Set between 0.5(slow) and 2(fast).
- ***Integral*** - Increasing the integral will smooth out the PID when close to the *setpoint*. This increases the time to get to stable set point if flow is not changing. Set between 1 (fast/unstable) to 50 (slow/stable).
- ***Derivative*** - Derivative should be left at 1 and not be changed.

Note - PID responsiveness changes based on the analog range. Increasing the analog range will slow down the PID. For example, at 1000kPa with P = 1 and I = 10 would be similar to 1600kPa with P=1 and I = 3.

12 - ADDITIONAL INFORMATION FOR SETTING THE NO DEMAND SPEED

The *No demand speed* is a critical parameter for the proper operation of the pressure VSD configuration, particularly for the correct operation of the sleep and destaging functions. The no demand is to be set at the speed (Hz) at which one pump achieves the *setpoint* against a dead head (shut discharge valve). If the system is operating as a mains boosting system with fluctuating mains pressure it is best to set the *no demand speed* for the highest incoming mains pressure.

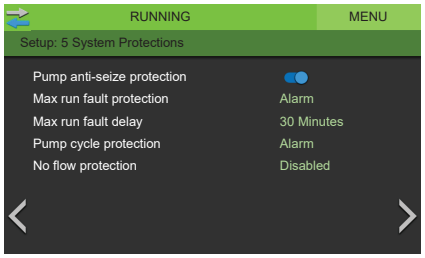
Follow these steps to find the no demand speed:
- Enter the required operating *setpoint* in the setup.
- On the main screen, place the system into auto mode.
- Open the main valve/tap of the system slightly. One pump should start.
- While the pump is running, slowly close the main discharge valve until it is just leaking a little water. The VSD should slow down to a stable speed holding pressure at the required *setpoint*.
- Read the pump speed on the main screen. The *no demand speed* should be set 0.5Hz above this speed in the setup.
- If the speed is 25Hz the test failed, run the test again. This time try reopening the valve then closing with a slightly larger leak.

Alternatively, if there is no main discharge valve and no water is being used, follow these steps:
- Enter the required *setpoint* in the setup.
- On the main screen, place the system into manual mode.
- Ensure that the system pressure is less than the required *setpoint*.
- Put one pump into manual at an initial speed of 25Hz. The *manual speed* can be adjusted by touching on the speed on the main screen. The system must be in manual mode to do this.
- Check if the pressure reading is at the required *setpoint*.
- If not, increase the *manual speed* in small steps until the system pressure is at the required *setpoint*.
- Once the *setpoint* is reached, read the pump speed on the main screen. The *no demand speed* should be set 0.5Hz above this speed in the setup.

If the *setpoint* is changed then the *no demand speed* will need to be recalculated because it relates to the pump performance at the system pressure.

13 - SYSTEM PROTECTIONS

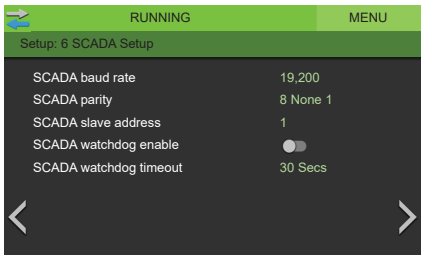
The optional additional system protections.



Pump anti-seize protection	If any pump has not run for 7 days, the pump will be run for 5 seconds to prevent seizing, as long as the system mode is in sleep, disabled or inhibit.
Max run fault protection	Alarm = Alarm only if a pump runs continuously for the *max run fault delay*. Pump = If a pump runs continuously for the *Max run fault delay* then the pump will inhibited, with 5 restart attempts before locking out the pump. System = If all available pumps are running continuously for the *Max run fault delay* then the system will be inhibited, with 5 restart attempts before locking out the system.
Max run fault delay	The delay period that the pumps run continuously for, before the *Max run fault protection* is activated.
Pump cycle protection	If the system goes to sleep but wakes up within 5 seconds 10 times within an hour, the fault will be activated. Alarm = Alarm only, Lockout = Alarm and pump shut down.
No flow protection	Alarm = Alarm only if a pump runs with no flow for 30 seconds. Pump = If a pump runs with no flow for 30 seconds then it will be inhibited and another pump brought into operation. System = If a pump runs with no flow for 30 seconds then the system will be inhibited. The controller will attempt to restart the inhibited pump or system after a 30 minute delay. If 5 consecutive restarts fail to achieve flow the pump or system will be locked out. **Note -** This function uses a 'close on flow' flow switch connected to the low level alarm input instead of a low level float switch.

14 - SCADA SETUP

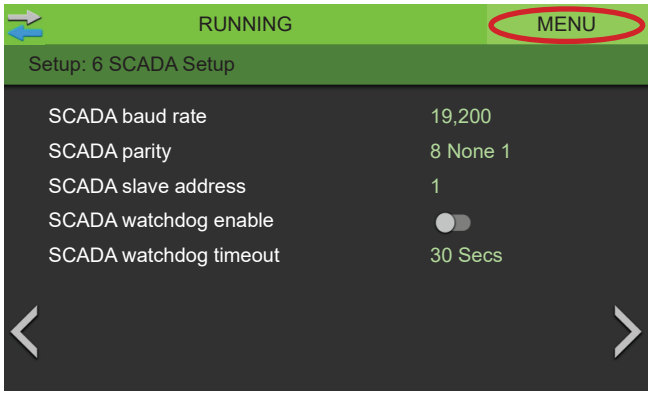
The SCADA setup for remote monitoring and control over the Modbus RS485 connection.



SCADA baud rate	The speed of the modbus communications.
SCADA parity	The bit format of the modbus packets.
SCADA slave address	The slave ID of the device. Each device on the one serial link must have a different device number.
SCADA watchdog enable	If enabled modbus register 3817 must be successful written =1 less than every *SCADA watchdog period* otherwise a SCADA watchdog alarm will be activated and the pumps shutdown. This is used as a 'Keep alive' function.

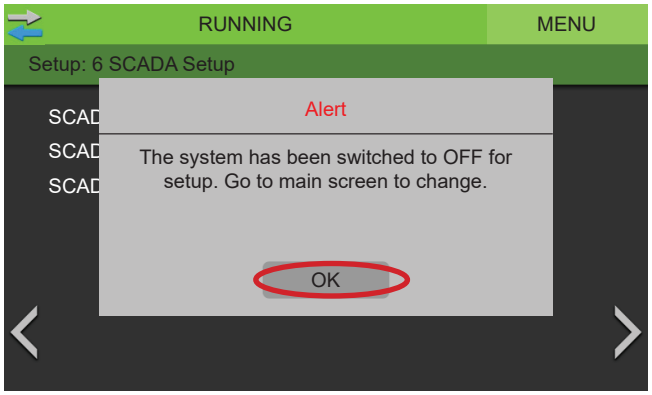
15 - RETURN TO MENU

Once all the Setup screens have been completed, tap to return to the Menu screen.



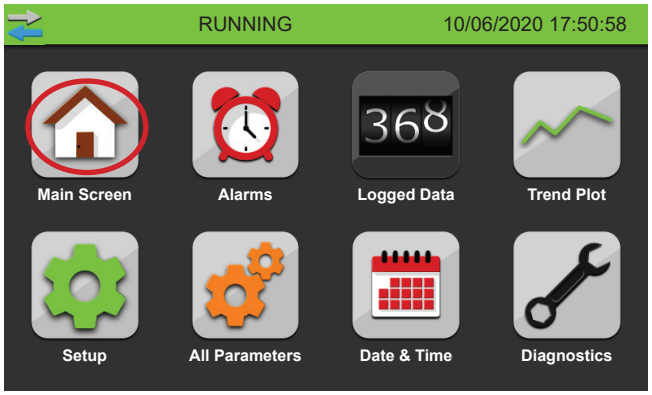
16 - WARNING

After pressing on Menu, a warning screen will appear stating that the system must be placed back in auto mode. Press OK to continue to Menu.



17 - MENU

Once back on the Menu screen tap on the Main screen icon, where the System Mode needs to be changed.

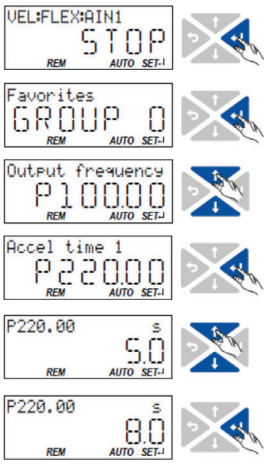


VSD COMMISSIONING (LENZE DRIVES)

See following pages for ABB or Nidec drive commissioning.
To commission VSDs access to live parts is required. This step should only be completed by someone suitably qualified to do so.

KEYPAD NAVIGATION

Follow the steps below to enter and edit the parameters list.



1. Use the ↵ key in the operating mode to navigate to the parameterisation mode one level below. You are now in the group level. All parameters are divided into different groups according to their function .Group '0' contains the 'favourites'. Note: By using the ↩ key you can navigate upwards again anytime.
2. Use the ↵ key to navigate to one level below. You are now in the parameter level of the group selected.
3. Use the ↑ and ↓ navigation keys to select the desired parameter.
4. Use the ↵ key to navigate to one level below. You are now in the editing mode.
5. Set the desired value using the ↑ and ↓ navigation keys.
6. Use the ↵ key to accept the changed setting. The editing mode is exited. Note: By using the ↩ key you can exit the editing mode without accepting the new setting (abort).

SAVING THE PARAMETER SETTING WITH THE KEYPAD

If one parameter setting has been changed with the keypad but has not been saved in the memory module with the mains failure protection, the SET display is blinking. In order to save the parameter settings in the user memory of the module, press the keypad enter key for more than 3s.

1 - SET PUMP PARAMETERS

The pump motor data MUST be entered into each drive to ensure proper control and direction.
The main pump parameters (GROUP 3) should be entered as below.

0x2C01:004 (P320.04)	Motor parameters: Rated speed (Motor parameters: Rated speed) Device for 50-Hz mains: 50... (1450) ...50000 rpm Device for 60-Hz mains: 50... (1750) ...50000 rpm	General motor data. Carry out settings as specified by motor nameplate data. Note! When you enter the motor nameplate data, take into account the phase connection implemented for the motor (star or delta connection). Only enter the data applying to the connection type selected.
0x2C01:005 (P320.05)	Motor parameters: Rated frequency (Motor parameters: Rated frequency) Device for 50-Hz mains: 1.0... (50.0) ...1000.0 Hz Device for 60-Hz mains: 1.0... (60.0) ...1000.0 Hz	
0x2C01:006 (P320.06)	Motor parameters: Rated power (Motor parameters: Rated power) 0.00 ... (0.25)* ... 655.35 kW * Default setting depending on the size.	
0x2C01:007 (P320.07)	Motor parameters: Rated voltage (Motor parameters: Rated voltage) 0 ... (230)* ... 65535 V * Default setting depending on the size.	
0x2C01:008 (P320.08)	Motor parameters: Cosine phi (Motor parameters: Cosine phi) 0 ... (0.80) ... 1.00	General motor data. Carry out settings as specified by motor nameplate data.

2 - REPEAT FOR ALL VSDS IN THE PANEL

Once Step 6.1A is completed for the first VSD, remove the screen and connect to the other VSDs in the panel and commission them. Then skip Step 6B and complete Step 7 to finish setting up the controller.

VSD COMMISSIONING (ABB)

See previous page for Lenze drive commissioning or following page for Nidec drive commissioning.
To commission VSDs access to live parts is required. This step should only be completed by someone suitably qualified to do so.

VSD CONTROL PANEL OVERVIEW

The following table summarises the key functions and displays on the basic control panel.

No.	Use
1	LCD display – Divided into five areas: a. Upper left – Control location: LOC: drive control is local, that is, from the control panel REM: drive control is remote, such as the drive I/O or fieldbus. b. Upper right – Unit of the displayed value. c. Center – Variable; in general, shows parameter and signal values, menus or lists. Shows also fault and alarm codes. d. Lower left and center – Panel operation state: OUTPUT: Output mode PAR: Parameter mode MENU: Main menu FAULT: Fault mode e. Lower right – Indicators: FWD (forward) / REV (reverse): direction of the motor rotation Flashing slowly: stopped Flashing rapidly: running, not at setpoint Steady: running, at setpoint SET: Displayed value can be modified (in the Parameter and Reference modes).
2	RESET/EXIT – Exits to the next higher menu level without saving changed values. Resets faults in the Output and Fault modes.
3	MENU/ENTER – Enters deeper into menu level. In the Parameter mode, saves the displayed value as the new setting.
4	Up – • Scrolls up through a menu or list. • Increases a value if a parameter is selected. • Increases the reference value in the Reference mode. • Holding the key down changes the value faster.
5	Down – • Scrolls down through a menu or list. • Decreases a value if a parameter is selected. • Decreases the reference value in the Reference mode. • Holding the key down changes the value faster.
6	LOC/REM – Changes between local and remote control of the drive.
7	DIR – Changes the direction of the motor rotation.
8	STOP – Stops the drive in local control.
9	START – Starts the drive in local control.

1 - SET PUMP PARAMETERS

No	Name	Description	Units
9905	MOTOR NOM VOLT	Defines the nominal motor voltage. Must be equal to the value on the motor rating plate.	Volts
9906	MOTOR NOM CURR	Defines the nominal motor current. Must be equal to the value on the motor rating plate.	Amps
9907	MOTOR NOM FREQ	Defines the nominal motor frequency, ie the frequency at which the output voltage equals the nominal motor voltage	Hz
9908	MOTOR NOM SPEED	Defines the nominal motor speed. Must be equal to the value on the motor rating plate.	rpm
9909	MOTOR NOM POWER	Defines the nominal motor power. Must equal the value on the motor rating plate.	kW

2 - REPEAT FOR ALL VSDS IN THE PANEL

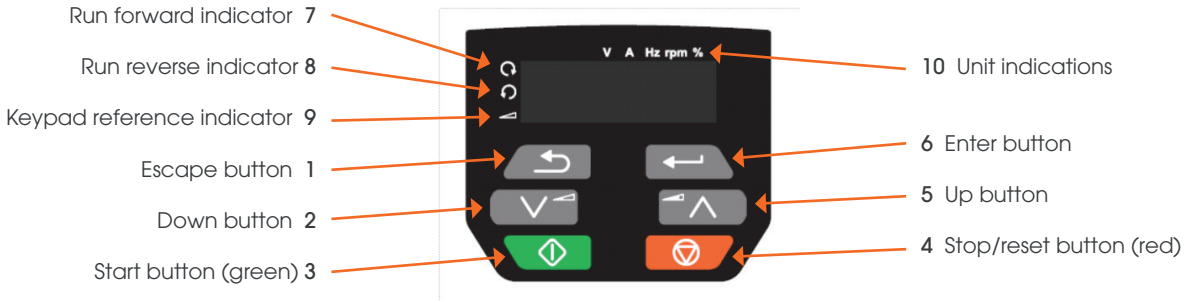
Once setup is completed for the first VSD, remove the screen and connect to the other VSDs in the panel and commission them.

VSD COMMISSIONING (NIDEC DRIVES)

See previous pages for Lenze or ABB drive commissioning.
To commission VSDs access to live parts is required. This step should only be completed by someone suitably qualified to do so.

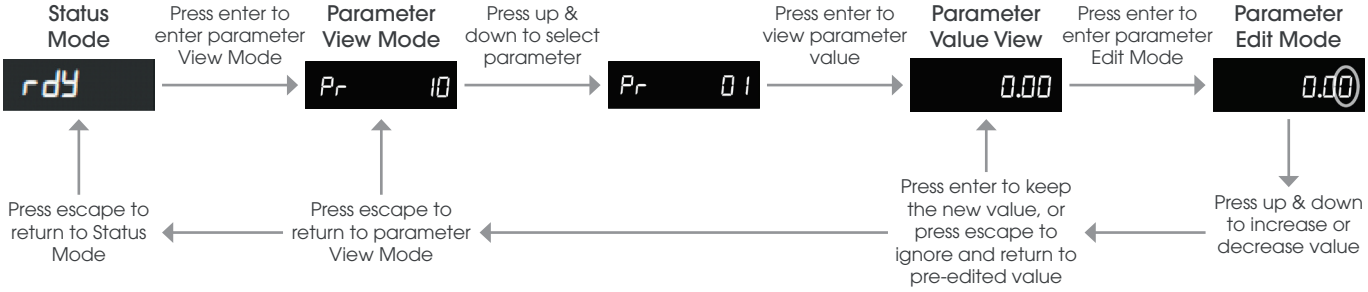
VSD CONTROL PANEL OVERVIEW

The following table summarises the key functions and displays on the basic control panel.



No.	Description	Use
6	Enter button	Used to change between parameter edit and view mode, as well as entering data. This button can also select between slot menu and parameter display.
2 & 5	Up and down buttons	Used to navigate the parameter structure and change parameter values.
1	Escape button	Used to exit from parameter edit and view mode, as well as entering data. In parameter edit mode, if parameter values are edited and the escape button is pressed, the parameter value will be restored to the value it had on entry to edit mode.
3	Start button (green)	Used to provide a run command if keypad mode is selected.
4	Stop/reset button (red)	Used to reset the drive. In keypad mode can be used for 'stop'.

VSD CONTROL PANEL NAVIGATION



SAVING PARAMETERS

After parameters have been changed, parameter 00 must be set to 'save', then press the red Stop/Reset Button to save them.

1 - SET PUMP PARAMETERS

No	Name	Description	Units
0.06	Motor Rated Current	Defines the nominal motor current. Must be equal to the value on the motor rating plate.	Amps
0.07	Motor Rated Speed	Defines the nominal motor speed. Must be equal to the value on the motor rating plate.	rpm
0.08	Motor Rated Voltage	Defines the nominal motor voltage. Must be equal to the value on the motor rating plate.	Volts
0.09	Motor Rated Power Cosine	Defines the motor rated power factor. Must be equal to the value on the motor rating plate.	ϕ
0.39	Motor Rated Frequency	Defines the nominal motor frequency, ie the frequency at which the output voltage equals the nominal motor voltage	Hz

2 - REPEAT FOR ALL VSDS IN THE PANEL

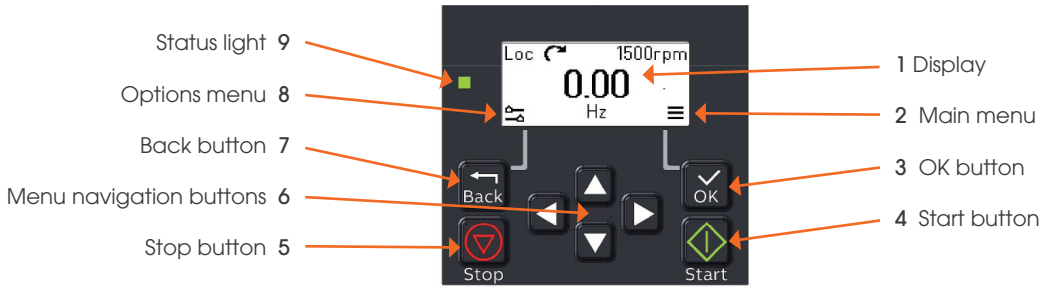
Once setup is completed for the first VSD, remove the screen and connect to the other VSDs in the panel and commission them.

VSD COMMISSIONING (ABB ACS180)

See previous pages for Lenze or ABB drive commissioning.
To commission VSDs access to live parts is required. This step should only be completed by someone suitably qualified to do so.

VSD CONTROL PANEL OVERVIEW

The following table summarises the key functions and displays on the basic control panel.



No.	Description	Use
1	Display	shows the *Home* view as default.
2	Main menu	Main menu display.
3	OK button	open the Main menu, select and save settings.
4	Start button	Start the drive.
5	Stop button	stop the drive.
6	Menu navigation buttons	Move in the menus and set values.
7	Back button	Open the Options menu, and move back in the menu.
8	Options menu	Options menu display.

1 - SET PUMP PARAMETERS

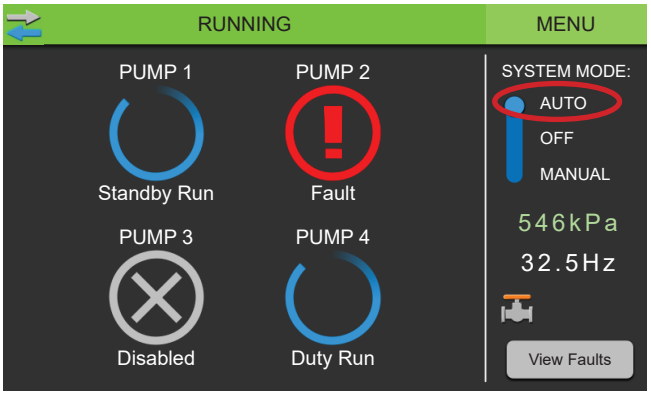
No	Name	Description	Units
99:06	MOTOR NOM CURR	Defines the nominal motor current. Must be equal to the value on the motor rating plate.	Amps
99:07	MOTOR NOM VOLT	Defines the nominal motor voltage. Must be equal to the value on the motor rating plate.	Volts
99:08	MOTOR NOM FREQ	Defines the nominal motor frequency, ie the frequency at which the output voltage equals the nominal motor voltage	Hz
99:09	MOTOR NOM SPEED	Defines the nominal motor speed. Must be equal to the value on the motor rating plate.	rpm

2 - REPEAT FOR ALL VSDS IN THE PANEL

Once setup is completed for the first VSD, remove the screen and connect to the other VSDs in the panel and commission them.

PUT SYSTEM IN AUTO

On the HMI's Main screen, change the System Mode to Auto by tapping on the toggle. The controller will now begin normal operation.



QUICK START COMPLETE

The controller is now configured and has begun operation. For more information on the operation of the Hydrokos controller, see the **Hydrokos VSD Operation Manual.**

USER SETTING

Setting	User Value	Setting	User Value	Setting	User Value
1 - System Setup					
System type					
Control output type					
Number of pumps					
Pump limit					
Duty change period					
2 - Analog					
Level		**Pressure**		**Temperature**	
Level analog enable		Pressure analog enable		Temperature analog enable	
Max level sensor range		Max level sensor range		Max temperature sensor range	
Setpoint		Setpoint		Setpoint	
Wakeup level step		Wakeup pressure drop		Wakeup temperature step	
Standby start level step		DOL Standby start pressure step		Standby start temp step	
Low level threshold		Low pressure threshold		Low temperature threshold	
High level threshold		High pressure threshold		High temperature threshold	

Setting	User Value	Setting	User Value	Setting	User Value
3 - Function					
Level		**Pressure**		**Temperature**	
Level control		Jacking pump		Temperature control	
Low level protection		Low pressure protection		Low temperature protection	
High level protection		High pressure protection		High temperature protection	
Sleep delay		Sleep delay		Sleep mode	
Tank top up valve enable		Mains bypass valve enable		Sleep delay	
Top up valve open level					
Top up valve closed level					
4 - VSD					
Level		**Pressure**		**Temperature**	
VSD full speed level		PID Proportional		VSD full speed temperature	
VSD speed at stop level		PID Integral		VSD speed at setpoint	
Manual speed		VSD No demand speed		Manual speed	
		Manual speed			
		Pipe fill			
		Sleep Assist			
		Sleep boost pressure increase			
5 - System Protections					
Pump anti-seize protection					
Max run fault protection					
Max run fault delay					
Pump cycle protection					
No flow protection					
6 - SCADA					
SCADA baud rate					
SCADA parity					
SCADA slave address					
SCADA watchdog enable					
SCADA watchdog period					