Before beginning any installation, review Danfoss Operating Instructions for VLT® AQUA Drive FC 202 0.25–90 kW (130R0336) for complete instructions and warnings. This guide neither supplements nor replaces the Owner's Manual.

Welcome to your new Pentek Intellidrive XL. Please review the following information to setup your drive for constant pressure applications.

For further information please reference the Danfos Design Guide for VLT AQUA Drive FC 202 (130R0337) and the Danfoss Programming Guide for VLT AQUA Drive FC 202 (130R0338).

Safety

⚠ WARNING **Hazardous voltage.** Can shock, burn, or cause death. Ground pump before connecting to power supply. Disconnect power before working on system components.

⚠ Wire pump motor for correct voltage. See motor nameplate.

⚠ Ground motor to drive before connecting to power supply.

⚠ Meet National Electrical Code, Canadian Electrical Code, and local codes for all wiring.

California Proposition 65 Warning

⚠ WARNING This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.
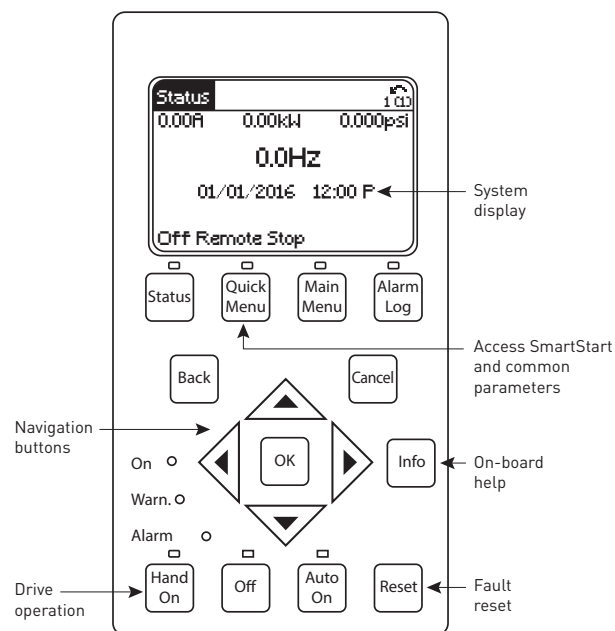

Figure 1. Local Control Panel — Your interface to the drive.

Basic Wiring for Constant Pressure using a 4-20mA Pressure Transducer

Refer to the Danfoss Operating Instructions for complete information on wiring the drive. The steps listed below are required for constant pressure operation with a 4-20mA pressure transducer.

Set the DIP Switch

Step 1: Remove Keypad and Keypad Holder

The keypad holder is secured to the drive with four tabs. Gently squeeze the keypad holder at the top and bottom near where the holder is attached to the drive. See Figure 2.
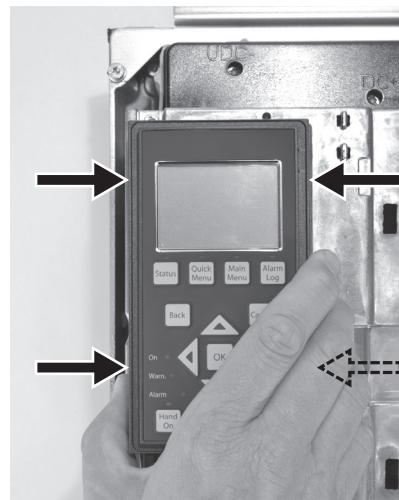

Figure 2.

Once the holder has been loosened, pull the keypad and keypad holder off of the drive. See Figure 3.
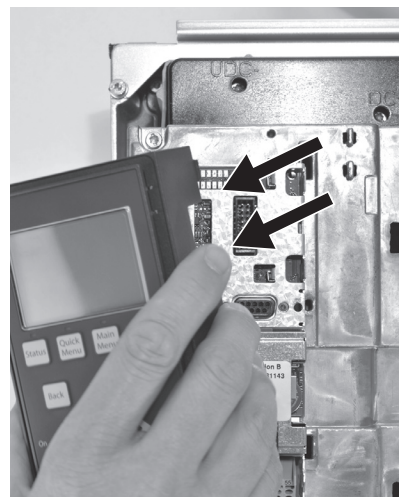

Figure 3.

Step 2: Remove the MCB 109 Option Card

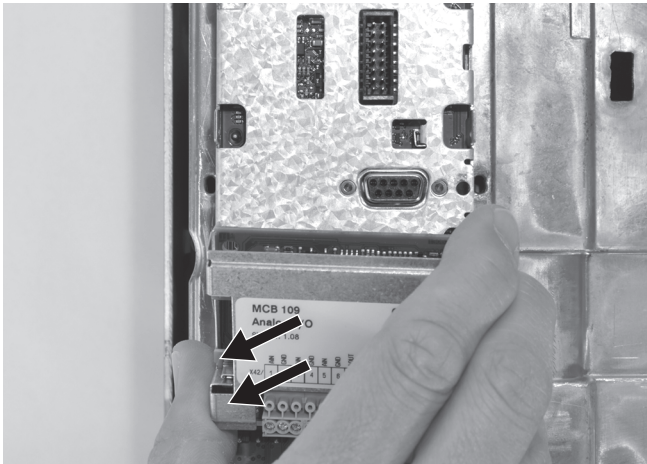Grasp the card and pull straight out from the drive. See Figure 4.

Figure 4.

Step 3: Install terminal block.

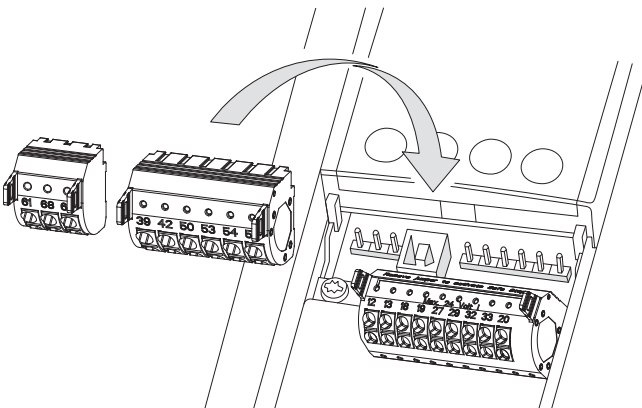Retrieve the terminal blocks from the Accessory Bag and install as shown. See Figure 5.

Figure 5.

Step 4: Set A54 dip switch

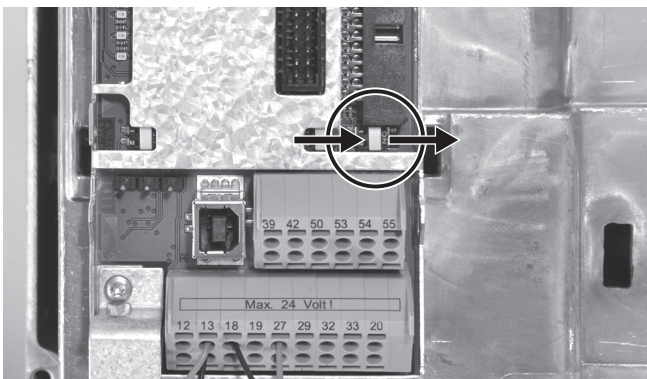Using a small screwdriver, move the switch to the right. See Figure 6.

Figure 6.

Step 5: Reassemble the components

Put the components back on the drive. To avoid damaging the option card and keypad, please use care during the reassembly process.

Prepare Transducer Cable

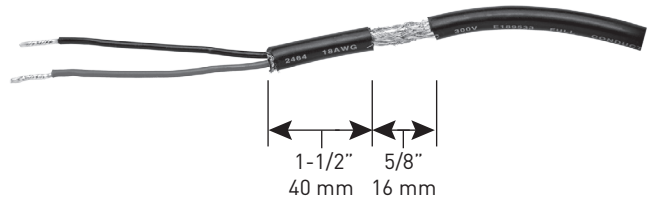Remove insulation to expose cable shielding. See Figure 7. Cut off green wire (if applicable).

Figure 7.

Wire the Pressure Transducer

The Black wire goes to Terminal 54. The Red wire goes to Terminal 12. Clamp the bare spot on the cable to ground the shielding. See Figure 8.
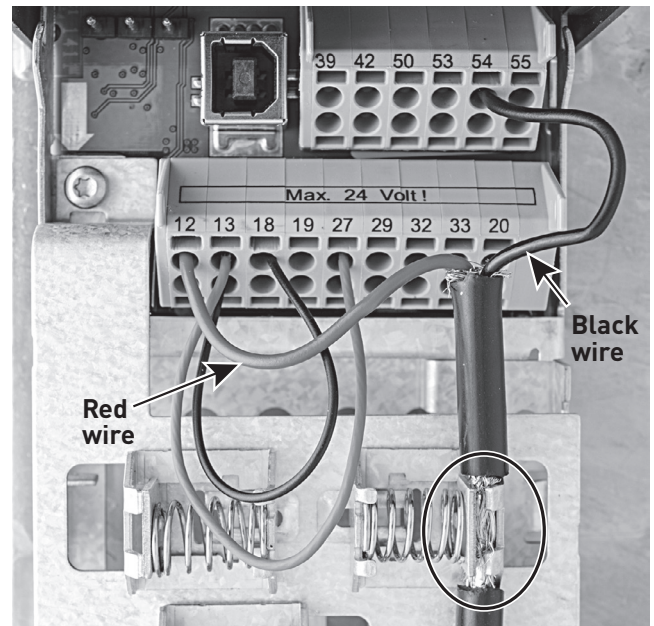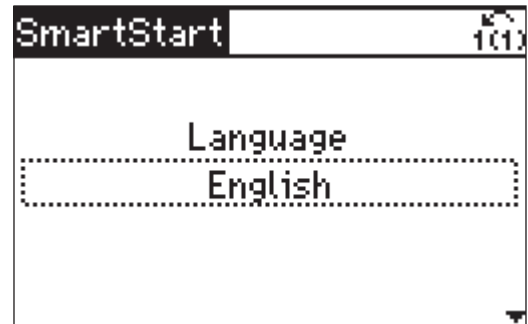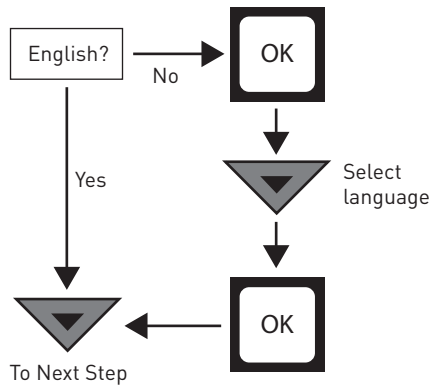
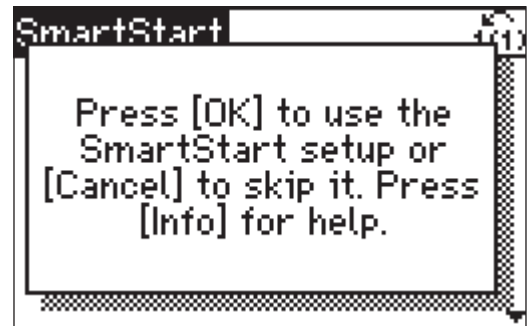**Figure 8.**

Install Jumper Wires

Install an 18 - 22 AWG Jumper wire between Terminal 13 and Terminal 27. Install a second Jumper wire between Terminal 13 and Terminal 18. See Figure 8.

ATTENTION: Before programming, the system must be able to be primed and then run with a closed valve to teach the drive about no flow operation.

1

English? → No → OK

Yes ↓

↓ Select language

↓

OK → To Next Step

```
SmartStart            1(1)


        Language
         English

```

2

OK

```
SmartStart            1(1)

   Press [OK] to use the
   SmartStart setup or
   [Cancel] to skip it. Press
   [Info] for help.

```

3

Ag/Irrigation? → No → OK

Yes ↓

↓ Select

↓

OK → To Next Step

```
SmartStart            1(1)


       Application:
       Ag/Irrigation

```
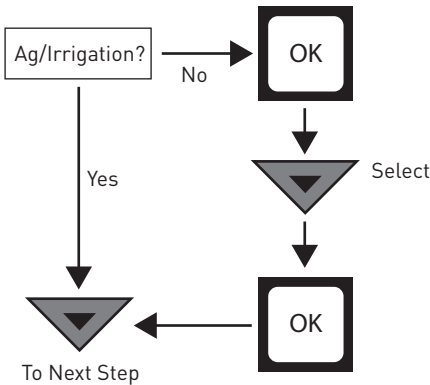
Allow 3 to 5 seconds for the drive to configure. Please wait until the screen shows Step 5 before proceeding.

4

OK → ◀ ▲ ▶ → OK

Move between characters and set values   ▼   To Next Step

```
SmartStart            1(1)


      Date and Time
   04/29/2016 11:12 A Fri

```

5

Above → (No) → OK

Yes ↓

↓ Select

↓

OK →

To Next Step

SmartStart

Motor Type:
Above ground

6

Select Motor Power

OK → ⬍ → OK → ▽

Select Motor Voltage

OK → ⬍ → OK →

↓

To Next Step

SmartStart

Motor Power [HP]
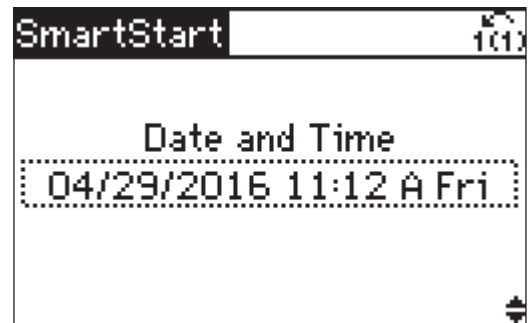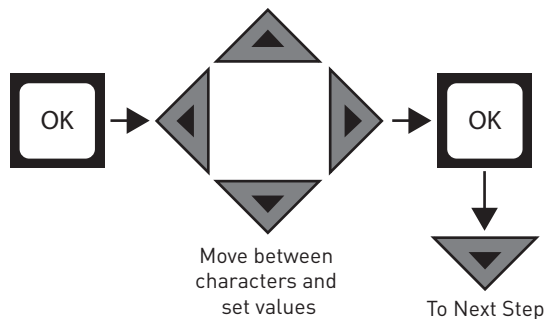5.00 hp

Motor Voltage
460 V

7

Select Motor Current

OK → ⬍ → OK → ▽

Enter Motor Nominal Current
Select Motor Speed

OK → ⬍ → OK →

↓

To Next Step

SmartStart

Motor Current
7.30 A

Motor Nominal Speed
1704 RPM

8

OK

To Next Step

SmartStart

Check DIP switch for
Analog input 54 from U
to I under keypad at the
bottom of the cradle

9

| OK<br>To Next Step | ```
SmartStart                  1(1)

   Exit wizard and prepare
     system for load tests


``` |

The next step runs the drive manually. That step (and the following steps) should be performed with no flow in the system (i.e. with a closed valve). The drive is learning about Sleep and Dry Run and to do this properly, there should not be any flow in the system – including flow into a pressure tank.

```
Status                      1(1)
0.00A     0.00kW     0.000psi

        0.0 Hz

    01/01/2016   12:00 P
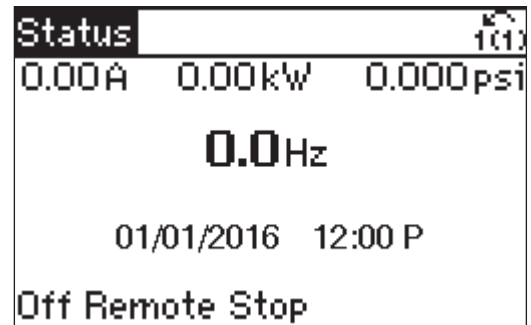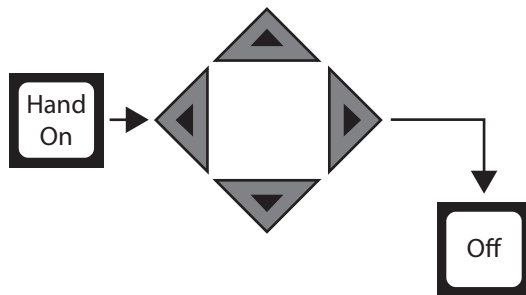
Off Remote Stop
```

10

Hand On → ◄ ▲ ▼ ► → Off

Ramp up the frequency (motor speed) until the display indicates 30 Hz. Verify motor rotation and fill pipes.

With a closed valve, slowly increase the frequency (motor speed) to 50 Hz. **Monitor pressure on the display during ramp up to avoid over pressurizing the system.** Once the drive has reached 50 Hz and a safe and stable pressure, press the OFF button. If the system over pressurizes before getting to 50 Hz, press OFF button and go to **Appendix A – Manual Sleep Setup** to complete the drive setup.

```
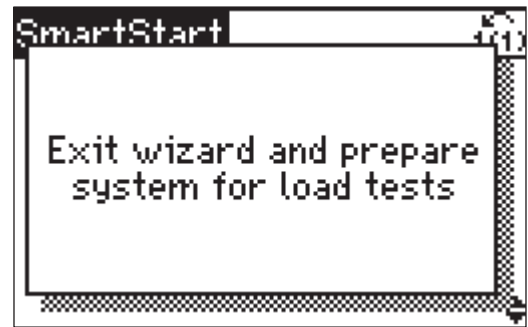Status                      1(1)
1.11A     0.51kW     0.000psi

        50.000Hz

0.000                    60.000

Off Local Running
```

11

Quick Menu → ▼ (To SmartStart) → OK

```
0.00A          0.00kW      ↻
                            1(1)
Quick Menus
Q1 My Personal Menu
Q2 Quick Setup
Q3 Function Setups
Q4 SmartStart
```

12

OK → ▼ (Enabled) → OK

```
SmartStart                  ↻
                            1(1)

      Low Power Autosetup
           Enabled
```

13

OK

```
Status                      ↻
                            1(1)
0.20A     0.09kW     0.000psi
      Have output speed low and
      high limits been set?  Press
      [OK] if set or press [Cancel]
              to abort

Off Local Stop
```

14   Make sure the system is primed and a valve is closed.

15

Hand On

```
Status                      ↻
                            1(1)
0.20A     0.09kW     0.000psi
      Close outlet valve and press
           [Hand On] to start the
              No-Flow Set-up
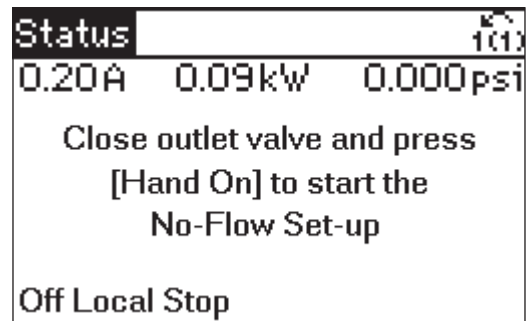
Off Local Stop
```

16 Wait while setup process completes

```
Status                          1(1)
0.20A      0.09kW      0.000psi

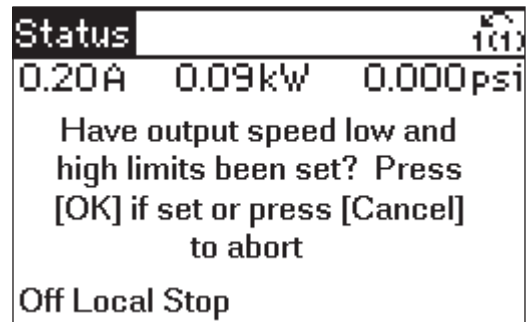            Step 1 of 4

[███         ]

Hand Local Ramping
```

17

OK

```
Status                          1(1)
0.20A      0.09kW      0.000psi
Auto Set-up completed. Open
the valve.  Press [OK] to
save results or [Cancel] to
discard

Hand Local Running
```

18

▼
To Next Step

```
SmartStart                      1(1)

Low Power Autosetup
Off


                               ▼
```

19

OK

```
SmartStart                      1(1)


All done. Press [OK] to
exit.
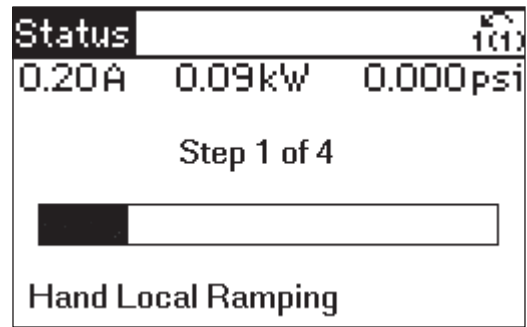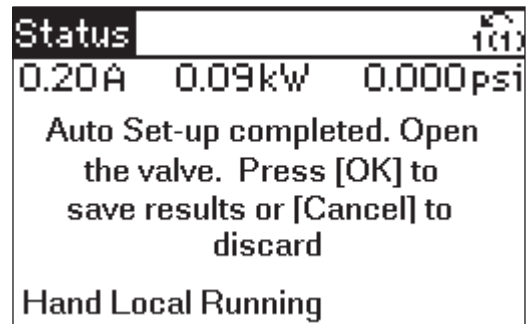

```

Adjust Live Zero Settings

20 Press and hold Main Menu for three (3) seconds.

```
0.000RPM      0.000    🔄
Shortcut
_____

      Enter parameter number


           0█-**
```

21 Enter Parameter Number 06-00 using the arrow keys. Press OK.

```
0.000RPM      0.000    🔄
Shortcut
_____

      Enter parameter number


           06-0█
```

22 Press OK to highlight and change to "000:01 min : s" using arrow keys. Press OK to save. Press the Down Arrow ot navigate to 6-01 - Live Zero Timeout Function.

```
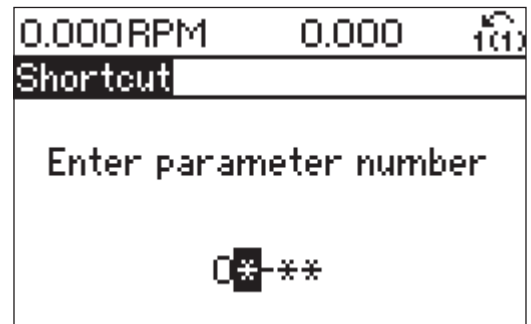0.000RPM      0.000    🔄
Analog I/O Mode       6-0*
6-00 Live Zero Timeout
        Time
000:0█ min : s
▼_____
```

23 Press OK to highlight and change to "[2] Stop" using arrow keys. Press OK to save. Press Status to return to main screen.

```
0.000RPM      0.000    🔄
Analog I/O Mode       6-0*
6-01 Live Zero Timeout
        Function
█2█ Stop
```

24

Auto On

```
Status                    1(1)
12.4A    5.76kW    0.000psi
           6.6Hz
      01/01/2016   12:00 P
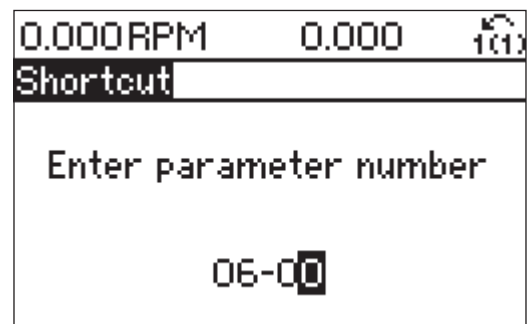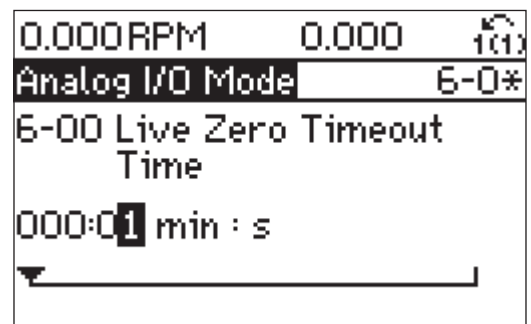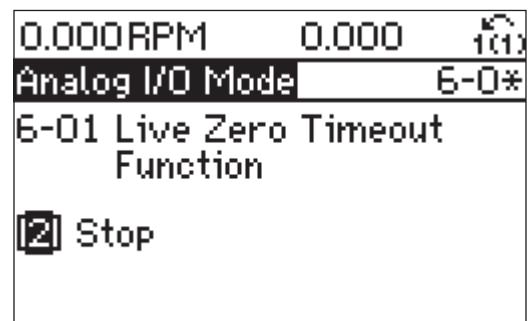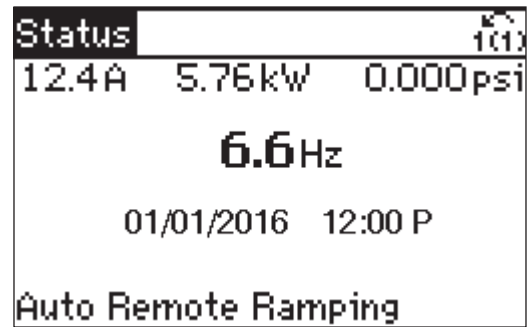
Auto Remote Ramping
```

25 Use My Personal Menu to access commonly adjusted parameters: Setpoint, Ramp Times, Transducer Limits and PID and Pipe Fill Settings. See table below for a list of the parameters and their default settings.

Quick Menu → ▼ → OK

To My Personal Menu

Refer to Danfoss Operating Instructions (130R0336), Design Guide (130R0337), and Programming Guide (130R0335) for further details.

```
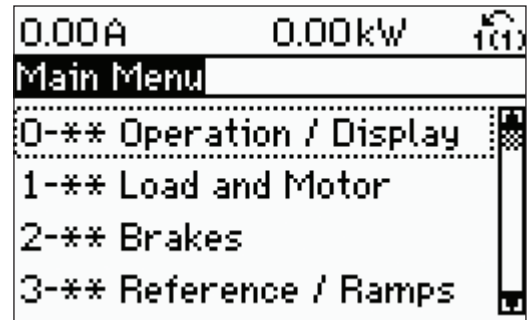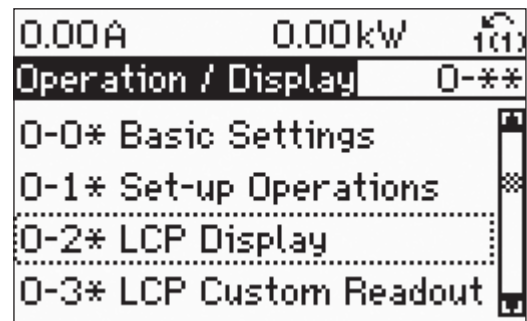0.000RPM      0.000      1(1)
Quick Menus
Q1 My Personal Menu
Q2 Quick Setup
Q3 Function Setups
Q4 SmartStart
```

Parameter Name	Default Value
0-01 Language	English
3-41 Ramp 1 Ramp Up Time	5.0 Sec
3-42 Ramp 1 Ramp Down Time	5.0 Sec
3-84 Initial Ramp Time	1.0 sec for Submersible / Off for Above Ground
4-12 Motor Speed Low Limit	30 Hz for Submersible / 0 Hz for Above Ground
4-14 Motor Speed High Limit	60 Hz
6-25 Terminal 54 High Ref. / Feedb. Value	100 PSI
14-20 Reset Mode	Automatic Reset x 3
14-21 Automatic Restart Time	10 Min
20-21 Setpoint 1	60 PSI
20-93 PID Proportional Gain	2.00
20-94 PID Integral Time	8.00 Sec
22-24 No Flow Delay	10 Sec
22-27 Dry Pump Delay	10 Min
22-40 Minimum Run Time	1 Min
22-41 Minimum Sleep Time	30 Sec
22-44 Wake-Up Ref./FB Difference	10%
29-00 Pipe Fill Enable	Enabled
29-02 Pipe Fill Speed	45 Hz
29-03 Pipe Fill Time	60 Sec
29-05 Filled Setpoint	10 PSI

This process describes the steps necessary to manually set sleep paramters for systems that build unacceptable system pressure at 50Hz.

A1 Press Main Menu. Press OK at 0-**
Operation / Display.

```
0.00A          0.00kW      ⌂(1)
Main Menu
0-** Operation / Display
1-** Load and Motor
2-** Brakes
3-** Reference / Ramps
```

A2 Scroll down to 0-2* LCP Display and Press OK.

```
0.00A          0.00kW      ⌂(1)
Operation / Display    0-**
0-0* Basic Settings
0-1* Set-up Operations
0-2* LCP Display
0-3* LCP Custom Readout
```

A3 For parameter 0-20, press OK to Highlight and change to "[1611] Power [hp]". Press OK to store the value and then Status to return to the main screen.

```
0.00A          0.00kW      ⌂(1)
LCP Display            0-2*
0-20 Display Line 1.1
      Small
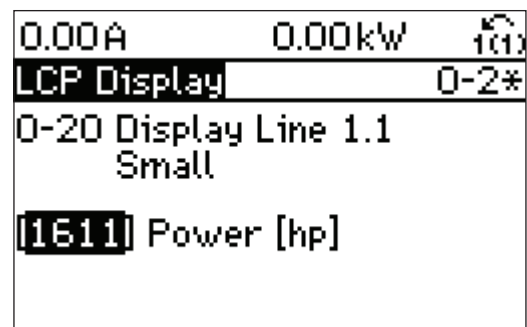
[1611] Power [hp]
```

A4 Close a valve to make sure there is No Flow in the system.

A5 Press Hand On and scroll up to 30Hz.

```
Status                     ⌂(1)
0.00hp   4.60kW    0.000psi

          30.000Hz
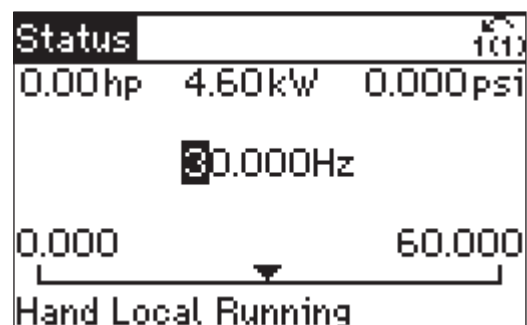
0.000                 60.000
         ▼
Hand Local Running
```

A6   When the system stabilizes, record the hp
          displayed in the upper left corner.

22-35 Low Speed Power = _____

A7   Slowly scroll up the speed (Hz) until a
          maximum safe pressure is achieved.   22-37 High Speed Hz = _____
          Record the Speed (Hz) that the drive is
          running at and the hp displayed in the   22-39 High Speed Power = _____
          upper left corner.

A8   Press Off.

A9

A10

A11 When asked to run Lower Power setup again, Highlight and change to "No". Press enter to save and Press Down Arrow.

```
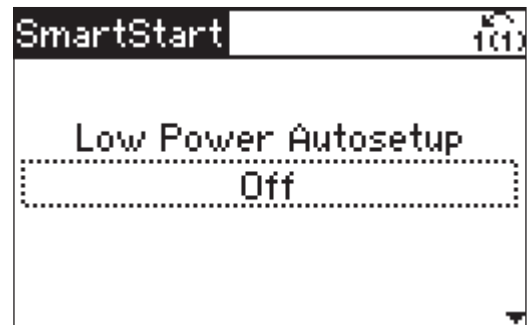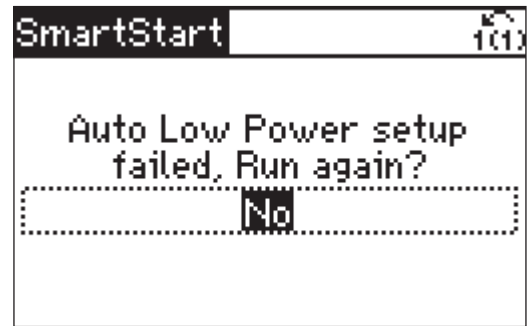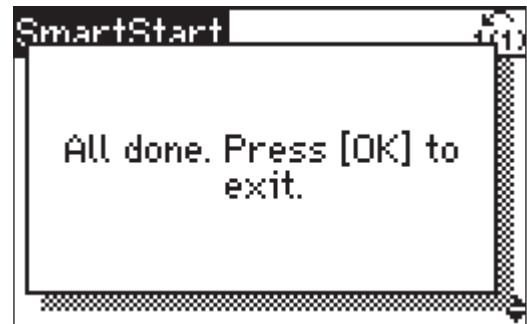SmartStart                    1(1)
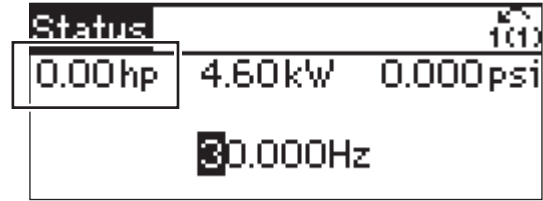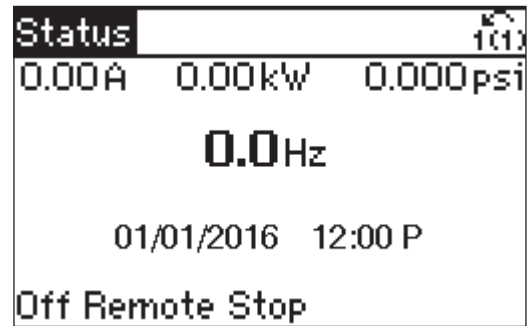
      Auto Low Power setup
        failed, Run again?
      ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
       │No│
      └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

A12

OK

```
SmartStart                    1(1)

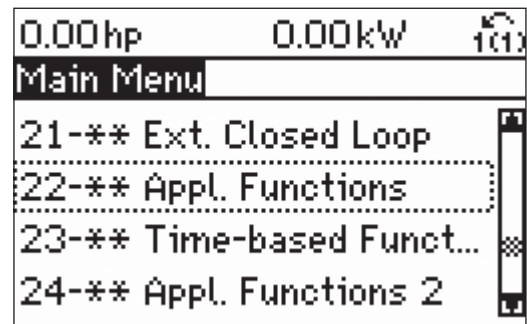      All done. Press [OK] to
              exit.
```

Adjust Sleep Parameters

A13 Press Main Menu twice, navigate to 22-** and press OK.

```
0.00hp          0.00kW    1(1)
Main Menu

21-** Ext. Closed Loop
22-** Appl. Functions
23-** Time-based Funct...
24-** Appl. Functions 2
```

A14 Scroll to 22-2* No-Flow Detection and Press OK.

```
0.00hp          0.00kW    1(1)
Appl. Functions        22-**
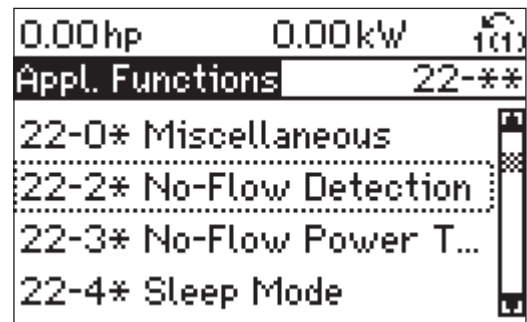
22-0* Miscellaneous
22-2* No-Flow Detection
22-3* No-Flow Power T...
22-4* Sleep Mode
```

A15 Scroll to 22-21 Low Power Detection. Press OK to highlight, change to [1] Enabled and press OK to save.

```
0.00hp         0.00kW      ⟳
No-Flow Detection     22-2*
22-21 Low Power
        Detection
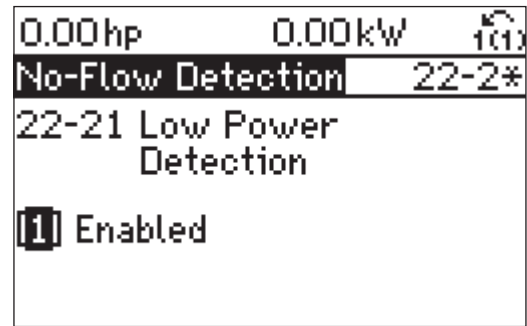
[1] Enabled
```

A16 Press the Back button and scroll down to 22-3* No-Flow Power T... and Press OK.

```
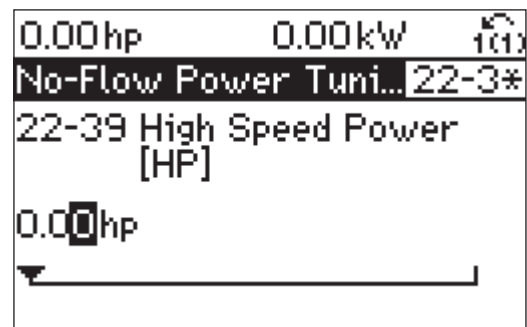0.000RPM       0.000       ⟳
Appl. Functions        22-**
22-0* Miscellaneous
22-2* No-Flow Detection
22-3* No-Flow Power T...
22-4* Sleep Mode
```

A17 Scroll to 22-37 High Speed Hz, press OK to highlight, change to speed noted in step 7, and press OK to save.

```
0.00hp         0.00kW      ⟳
No-Flow Power Tuni... 22-3*
22-37 High Speed [Hz]
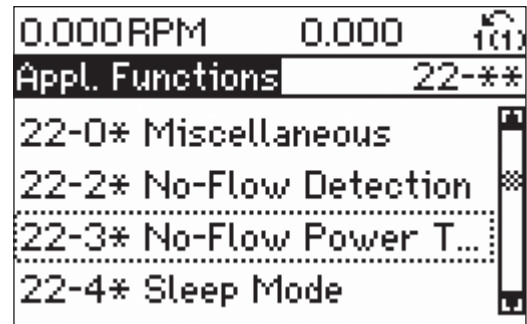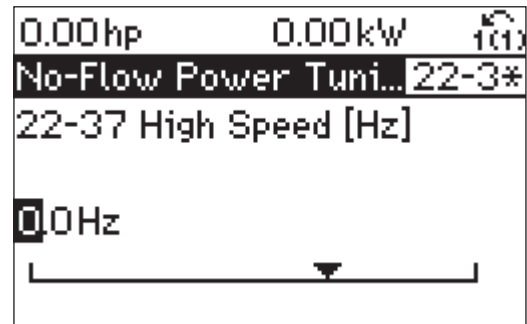

0.0Hz
```

A18 Scroll to 22-39 High Speed Power, press OK to highlight, enter the value from step 7 above, and press OK to save.

```
0.00hp         0.00kW      ⟳
No-Flow Power Tuni... 22-3*
22-39 High Speed Power
        [HP]
0.00hp
```

A19 Scroll to 22-33 Low Speed Hz, press OK to highlight, change to 30Hz, and press OK to save.

```
0.00A          0.00kW    1(1)
No-Flow Power Tuni...22-3*
22-33 Low Speed [Hz]
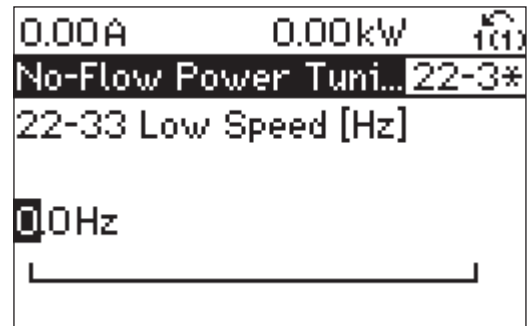

0.0Hz
   └─────────────────────┘
```

A20 Scroll to 22-35 Low Speed Power, press OK to highlight, enter the value from step 6 above, and press OK to save.

```
0.00hp         0.00kW    1(1)
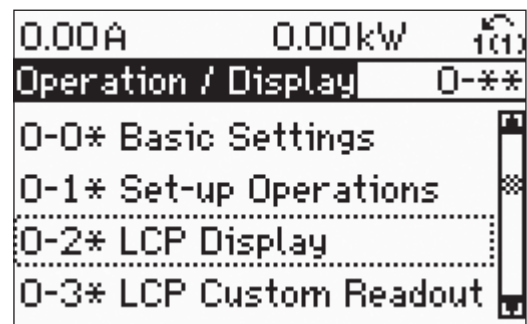No-Flow Power Tuni...22-3*
22-35 Low Speed Power
        [HP]
0.00hp
▼──────────────────────┘
```

A21 Press Main Menu twice. Press OK at 0-** Operation / Display.

```
0.00A          0.00kW    1(1)
Main Menu
0-** Operation / Display ▓
1-** Load and Motor
2-** Brakes
3-** Reference / Ramps  ▓
```

A22 Scroll down to 0-2* LCP Display and Press OK.

```
0.00A          0.00kW    1(1)
Operation / Display    0-**
0-0* Basic Settings
0-1* Set-up Operations
0-2* LCP Display
0-3* LCP Custom Readout
```

| **A23** | For parameter 0-20, press OK to Highlight and change to "[2230] No Flow Power [hp]". Press OK to store the value and then Status to return to the main screen. | 0.00hp   0.00kW   ⌂(1)
LCP Display   0-2*
0-20 Display Line 1.1
       Small

[2230] No-Flow Power |

| **A24** | The display now shows the power that triggers sleep in the upper left corner. The upper middle value shows the actual power being used. | **Status**   ⌂(1)
0.00kW   0.00kW   0.000psi

0.0 Hz

01/01/2016   12:00 P

Off Remote Stop |

| **A25** | Press Auto Start. Operate the drive in various conditions. Verify that the drive sleeps when it isn't using water and stays awake when it is. |

| **A26** | **Sleep (No Flow)**
When the drive is supposed to Sleep, the Sleep Power should be HIGHER than the Actual Power. This meand the drive is not using power to pump water. | Actual Power
Status   ⌂(1)
1.50kW   1.00kW   0.000psi
Sleep Power
0.0 Hz

01/01/2016   12:00 P

Off Remote Stop |
| | **Awake (with Low Flow)**
When the drive is supposed to Awake, the Actual Power should be HIGHER than the Sleep Power. This means the drive is using power to pump water. | Actual Power
Status   ⌂(1)
1.00kW   1.50kW   0.000psi
Sleep Power
0.0 Hz

01/01/2016   12:00 P

Off Remote Stop |

| **A27** | If the drive is sleeping properly, go to Step 32. If it isn't, navigate to 22-31 Power Correction Factor on the drive and go to the next step to fine tune the sleep parameters. |

A28 **SLEEPS USING WATER**

If the drive goes to sleep while still using water, parameter 22-31 Power Correction Factor needs to be adjusted. All systems are different. Consider changing from 100% to 96%.

```
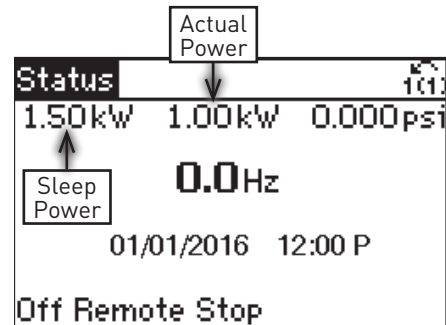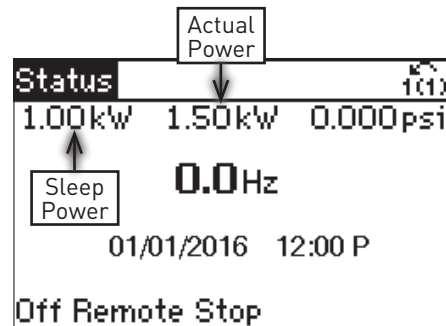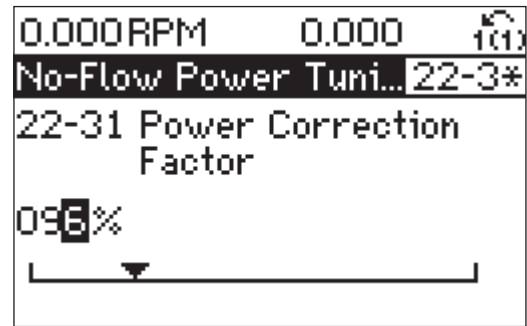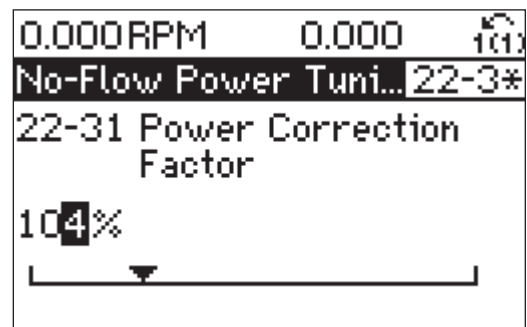0.000RPM      0.000    🔄
No-Flow Power Tuni...22-3*
22-31 Power Correction
        Factor
096%
     ▼
```

A29 Test the drive again. If the drive still sleeps while using water, continue to lower 22-31 Power Correction Factor until it stays awake while using water.

A30 **WON'T SLEEP WHEN NOT USING WATER**

If the drive stays awake while not using water, parameter 22-31 Power Correction Factor needs to be adjusted. All systems are different. Consider changing from 100% to 104%.

```
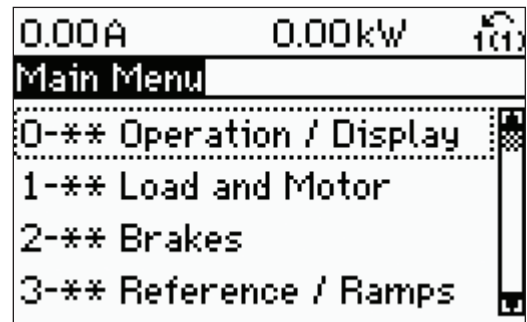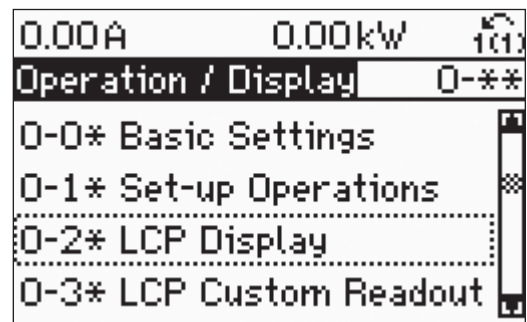0.000RPM      0.000    🔄
No-Flow Power Tuni...22-3*
22-31 Power Correction
        Factor
104%
     ▼
```

A31 Test the drive again. If the drive still stays awake when not using water, continue to raise 22-31 Power Correction Factor until it goes to sleep while not using water.

A32 Press Main Menu twice. Press OK at 0-** Operation / Display.

```
0.00A        0.00kW    🔄
Main Menu
0-** Operation / Display
1-** Load and Motor
2-** Brakes
3-** Reference / Ramps
```

A33 Scroll to 0-2* LCP Display and Press OK.

```
0.00A        0.00kW    🔄
Operation / Display    0-**
0-0* Basic Settings
0-1* Set-up Operations
0-2* LCP Display
0-3* LCP Custom Readout
```

A34 For parameter 0-20, press OK to Highlight and change back to "[1614] Motor current". Press OK to store the value and then Status to return to the main screen.

```
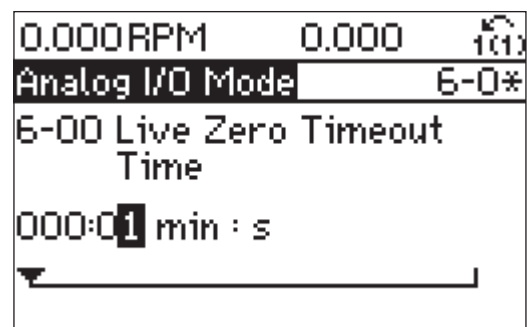0.000RPM      0.000    [icon]
LCP Display              0-2*
0-20 Display Line 1.1
        Small
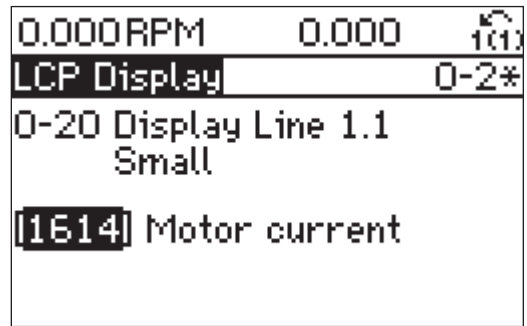
[1614] Motor current
```

A35 Press and hold Main Menu for three (3) seconds.

```
0.000RPM      0.000    [icon]
Shortcut

      Enter parameter number

            0█-**
```

A36 Enter Parameter Number 06-00 using the arrow keys. Press OK.

```
0.000RPM      0.000    [icon]
Shortcut

      Enter parameter number
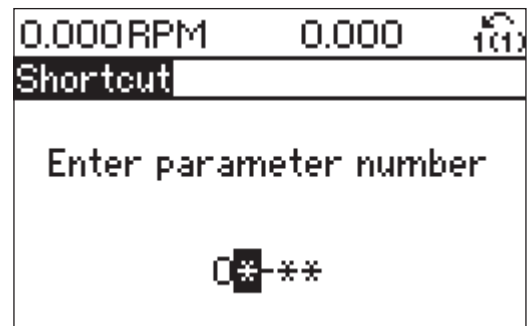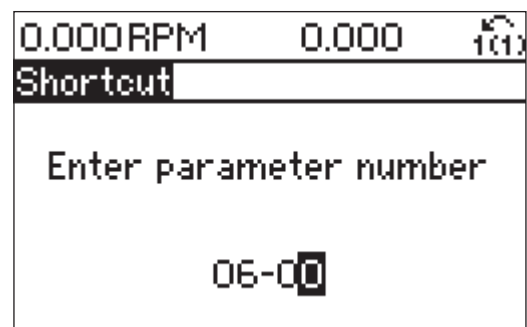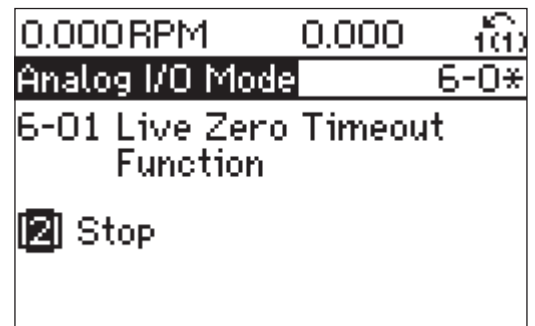
            06-0█
```

A37 Press OK to highlight and change to "000:01 min : s" using arrow keys. Press OK to save. Press the Down Arrow ot navigate to 6-01 - Live Zero Timeout Function.

```
0.000RPM      0.000    [icon]
Analog I/O Mode          6-0*
6-00 Live Zero Timeout
        Time
000:0█ min : s
▼
```

A38   Press OK to highlight and change to "[2] Stop" using arrow keys. Press OK to save. Press Status to return to main screen.

```
0.000RPM        0.000      ⟳
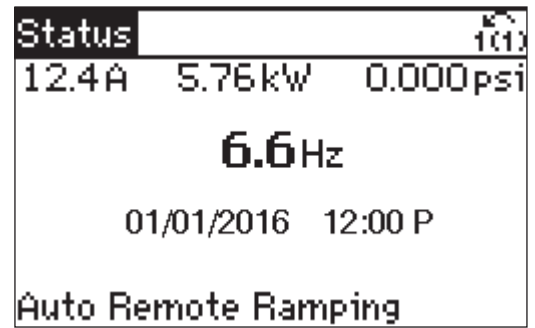                          1(1)
┌─────────────────────────────┐
│Analog I/O Mode        6-0*  │
└─────────────────────────────┘
6-01 Live Zero Timeout
        Function

[2] Stop
```

A39

Auto On

```
┌──────┐                 ⟳
│Status│                1(1)
└──────┘
12.4A    5.76kW    0.000psi

          6.6 Hz

    01/01/2016   12:00 P

Auto Remote Ramping
```

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