INVERTER DRIVE® SUPERMARKET

WEG CFW100 Frequency Inverter

Easy Start Guide

The WEG CFW100 Frequency Inverter range is available to order from inverterdrive.com

This guide is intended to complement the user manual provided by the manufacturer.
It is provided as a basic introduction to the product for Inverter Drive Supermarket customers.
It should not be used as a replacement for the manual issued by the manufacturer.

This product is not a safety device. All safety considerations including but not limited to Emergency Stop provision should be assessed separately and are outside the scope of this guide.

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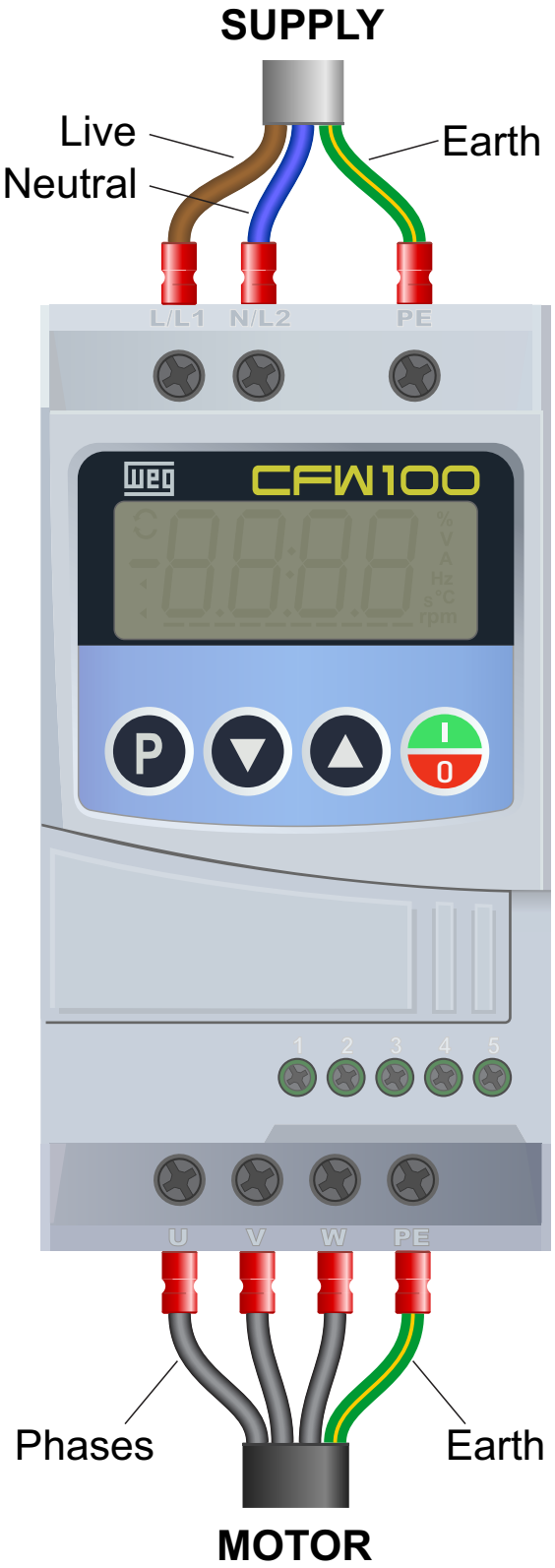
1. Power and Motor Connections (unfiltered)



Before commencing, confirm that the Inverter and all cables are completely isolated from the power supply, have been isolated for at least 5 minutes and that the motor is not turning.

Notes:

The illustration on the left is based on the smallest frame size. The terminal layout for larger frame sizes is the same.

When the optional EMC filter kit is fitted, the position of the supply connection changes. The position of the motor connection remains the same.

The order of the three motor phases determines the initial direction the motor turns. This can be reversed by physically swapping any two phases. Or, by changing the Inverter parameters.

Use screened cable between the Inverter and Motor. To minimise electromagnetic interference, ensure the cable screen is grounded.

The supply must match the Inverter specification.

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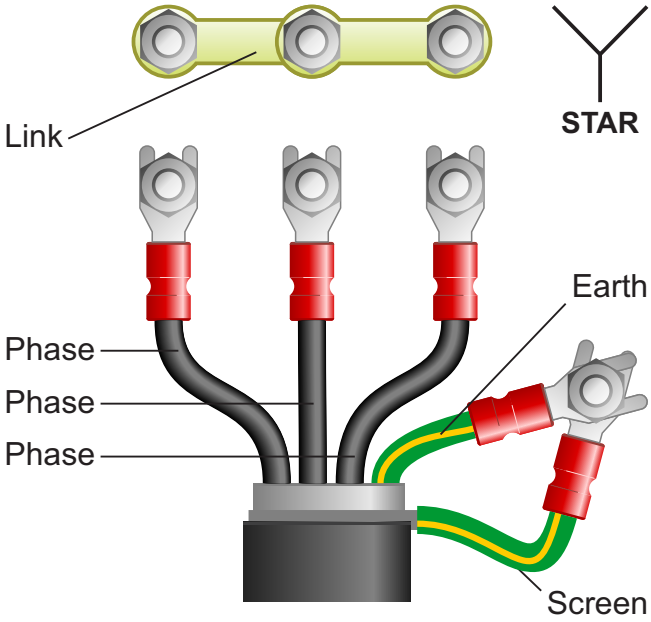
2. Motor Connections - Star and Delta

Dual voltage induction motors typically include six connection terminals. The terminals can be connected together with links in one of two ways to suit one of the two rated voltages.

The two ways of connecting the links are shown below. These are known as “Star” (the higher voltage) or “Delta” (the lower voltage).

The selection of Star or Delta is not optional and must match the supply voltage.

Dual voltage motor nameplates include symbols to represent voltage and full load current in each configuration.
Delta is represented by a triangle and star by a Y (Wye).



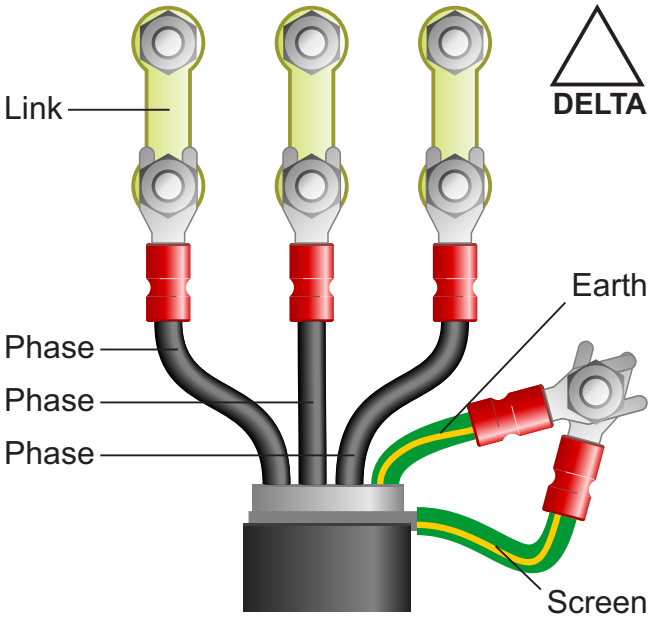
2.1 Motor connected in STAR (or Wye):

For safety purposes, Star (shown opposite) is the default configuration for small motors (usually to 3kW) and is sometimes known as “two at one side”.

Only two links are required for Star. Double-up the links if changing from Delta to allow the motor to be changed to back in future.

The order of the three phases determines the direction the motor turns.

Note that the cable screen and earth are connected together at the motor earth terminal.



2.2 Motor connected in DELTA:

The link configuration is shown in the illustration opposite and is sometimes referred to as “three-a-breast”.

The order of the three phases determines the direction the motor turns.

Note that the cable screen and earth are connected together at the motor earth terminal.

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3. Parameters - overview

The Inverter contains a number of settings which can be changed to tailor it for use in a wide range of applications. These settings are known as parameters.

Parameters are typically referred by code or number (eg. P401 = Motor Rated Current) with a description available in the manual.

The parameters contain critical information essential to the correct operation of the Inverter. Therefore, they should at least be checked by the user before the Inverter is operated for the first time.
The parameters listed in section 4 are intended to provide a starting point to allow for basic operation of the CFW100 Inverter.

4. Parameters to set before use

Set the following parameters to allow the CFW100 to control a motor with Run, Stop and Speed Control from the integrated keypad.

If any of the parameters have been changed previously, follow the procedure in section 12 to reset the Inverter to Factory Defaults.

See section 5 to learn how to set a parameter value.

4.1 Parameters to check and values to set

Parameter	Description	How to set
P100	Acceleration Time	Default is **5** seconds. Change as required.
P101	Deceleration Time	Default is **10** seconds. Change as required.
P133	Minimum Frequency Reference	Set to **5 Hz** for most applications. Can be set to the desired Hz for fixed speed applications.
P134	Maximum Frequency Reference	Set to **50 Hz** for most applications.
P135	Output Maximum Current	Set to **1.5** x rated current of the *Motor*. See motor nameplate for rated current.
P202	V/f Type of Control	Set to **0** for most applications or **1** for Fan or centrifugal pump.
P220	LOC/REM Selection Source	Set to **0** for always local (control via integrated keypad).
P224	LOC Run/Stop Sel.	Set to **0** for HMI (keypad) keys (Run/Stop via integrated keypad).
P229	Stop Mode	Set to **0** for ramp to stop (most applications). Set to 1 to coast to stop.
P401	Motor Rated Current (Amps)	Rated current of the motor. Set to match motor nameplate and wiring - eg. Motor **1.4 Amps**.
P402	Motor Rated Speed (rpm)	Set to match motor nameplate approx. **1400 for 4 pole**, 2800 for 2 pole etc.
P403	Motor Rated Frequency (Hz)	Set to match motor nameplate - normally **50Hz** for Europe.

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5. How to set a Parameter value

5.1 Press the P key to access parameters

With the motor stopped and any fault or alarm messages cleared, press the P key to access the parameter list.

Note: Fault and alarm messages are prefixed with F or A and can be cleared by pressing the green and red start/stop button once.
If the display is already showing a value prefixed the P proceed to the next step.

5.2 Select the required parameter

Use the up and down arrows to locate the parameter you wish to change - in this case, P401 Motor Rated Current.

The units are shown on the right if applicable - in this case, A for Amps.

Press the P key to select the parameter.

5.3 Change the parameter value

Use the up and down arrow keys to change the value. In this case, the full load current shown on the motor nameplate is 1.4A so the parameter value is changed accordingly.

Press P to save the changes.

The display will return to the parameter list.

5.4 Conf message

If the parameter value conflicts with another parameter value, “Conf” will be displayed. This indicates that further parameters will need to be changed in order for the Inverter to operate normally. In many cases, this behaviour is to be expected.

Press P to clear this message. The display will return to the parameter list. An arrow will be displayed on the left to indicate an unresolved conflict.

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6. How to operate the Inverter from the keypad

6.1 Press the P key to access parameters

With the motor stopped and any fault or alarm messages cleared, press the P key to access the parameter list.

Note: Fault and alarm messages are prefixed with F or A and can be cleared by pressing the green and red start/stop button once.
If the display is already showing a value prefixed the P proceed to the next step.

6.2 Select parameter P121

Use the up and down arrow keys to locate parameter P121 - Frequency Reference via HMI (keypad).

Press P to select this parameter.

Note: the up and down arrow keys will change the speed only when parameter P121 is selected. Otherwise, it will scroll through the parameter list or change other values.

6.3 Set the desired speed in Hz

Use the up and down arrows to set the desired speed in Hz. For a standard 50Hz motor, 50.0 will run the motor at its rated speed, 25.0 half speed, 12.5 quarter speed and so on.

The allowable speed range can be set between the minimum and maximum speed references specified by parameters P133 and P134 respectively.

6.4 Press the green/red key to Start and Stop the motor

Pressing the green/red Start/Stop button will start the motor if stopped and stop it if started.

Use the up and down keys to change the speed as desired. This will be stored and used the next time the motor is started, even when power-cycled.

The bars shown at the bottom of the display indicate motor current by default. This can be changed in parameter P207.

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7. How to enable Sensorless Vector Mode (VVW)

The standard operating mode of the CFW100 Inverter is VxF. This is the simplest form of operation and controls Volts and Frequency to vary the speed of a standard Induction Motor.

The CFW100 can also operate in Sensorless Vector mode (VVW). This can improve motor performance without requiring a separate feedback device.

In order to improve performance, Sensorless Vector (VVW) requires a number of values to build a “model” of the motor it is controlling. These are described below.

Note: Sensorless Vector is not suitable where the motor rating is significantly lower than the Inverter rating or where more than one motor is being controlled.

7.1 Parameters to check and values to set

Parameter	Description	How to set
P202	V/f Type of Control	Set to **5** to enable sensorless vector control (VVW)
P178	Rated Flux (%)	Normally ok to leave at the default value of **100%**.
P399	Motor Rated Efficiency (%)	Check motor nameplate or manufacturer documentation
P400	Motor Rated Voltage (Volts)	Set to suit motor rating plate and terminal wiring. eg. **230V**
P401	Motor Rated Current (Amps)	Rated current of the motor. Set to match motor nameplate and wiring - eg. Motor **1.4 Amps.**
P402	Motor Rated Speed (rpm)	Set to match motor nameplate approx. **1400 for 4 pole**, 2800 for 2 pole etc.
P403	Motor Rated Frequency (Hz)	Set to match motor nameplate - normally **50Hz** for Europe.
P404	Motor Rated Power (kW)	Rated power of the motor in kW: **0** = 0.12, **1** = 0.19, **2** = 0.25, **3** = 0.37, **4** = 0.55, **5** = 0.75
P407	Motor Rated Power factor (cosφ)	Rated power factor of the motor. Enter cosφ value.
P409	Self-Tuning (Ω)	Motor phase stator resistance in ohms (Ω), assuming a star (Y) motor connection.

Once the parameters above have been set, VVW is active.
No “tuning” run is necessary.
An F033 fault indicates an incorrect VVW parameter value.

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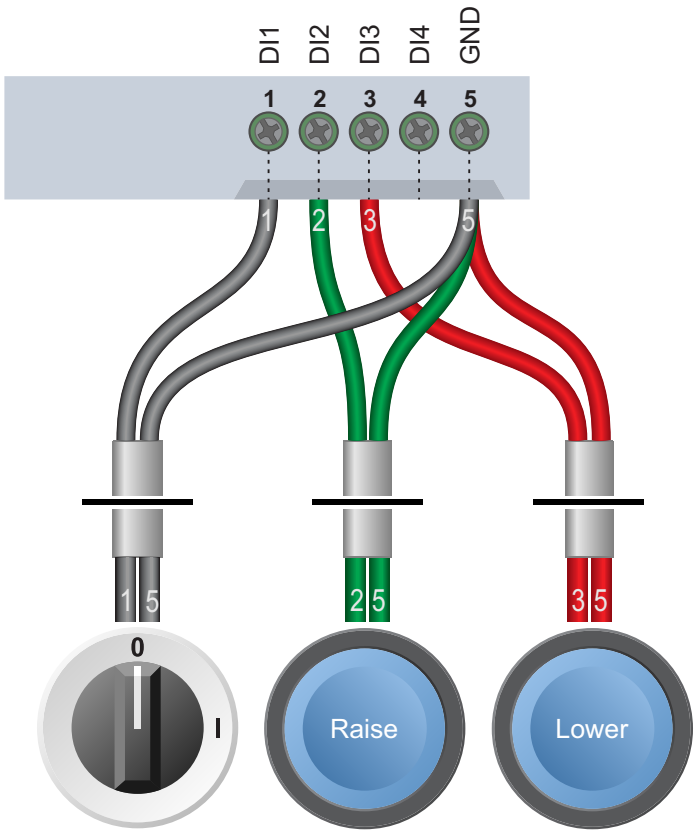
8. How to connect and configure a Run/Stop switch with Raise/Lower speed buttons “Electronic Potentiometer”

The procedure described in section 6 enables speed control using the up and down arrow keys on the Inverter.
If this is unsuitable for the application, remote raise/lower switches can be used instead.

This section explains how to enable 2-wire control with Run/Stop, raise and lower speed via separate switches/pushbuttons.
This configuration is known as an “Electronic Potentiometer” (EP).

8.1 Parameters to change for remote Run/Stop with Raise/Lower speed pushbuttons

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P222	REM Frequency Reference	Set value to **7** for Electronic Pot. E.P. (press P to clear “Conf” message if prompted).
P227	REM Run/Stop Selection	Set value to **1** for DIx.
P263	Function of Digital Input DI1	Set value to **1** for Run/Stop (this is the factory default).
P264	Function of Digital Input DI2	Set value to **11** for Electronic Potentiometer: Accelerate E.P.
P265	Function of Digital Input DI3	Set value to **12** for Electronic Potentiometer: Decelerate E.P..
P266	Function of Digital Input DI4	Set value to **0** for not used (this is the factory default).



Switch, 2 Position Normally Open “Start / Stop”

Pushbutton Normally Open “Raise”

Pushbutton Normally Open “Lower”

[Order Codes 31557 (x1), 29994 (x2), 30146 (x3), 30409 (x3)]

8.2 Connecting the Switches

For Run/Stop a suitable 2 position switch with normally open (NO) contact should be installed between DI1 and GND. For raise and lower speed, 2 suitable pushbuttons with NO contacts should be installed between DI2 and GND (raise) and DI3 and GND (lower).

When the motor is running, the raise button will continue to increase the speed for as long as it is pressed (or, until the maximum set in P134 is reached). The lower button will behave in the same way but reduce the speed. Pressing both buttons together will reset the speed to the minimum speed specified in P133.

Select parameter P002 to view the motor speed in Hz. The Inverter will return to the EP speed reference when restarted but this value cannot be viewed when the motor is stopped.

8.3 Connecting an analogue Potentiometer

In standard form, the CFW100 does not include the analogue input (AI) required for a potentiometer.
If speed control via potentiometer is preferred, the optional IO expansion module must be fitted (order code 27840).

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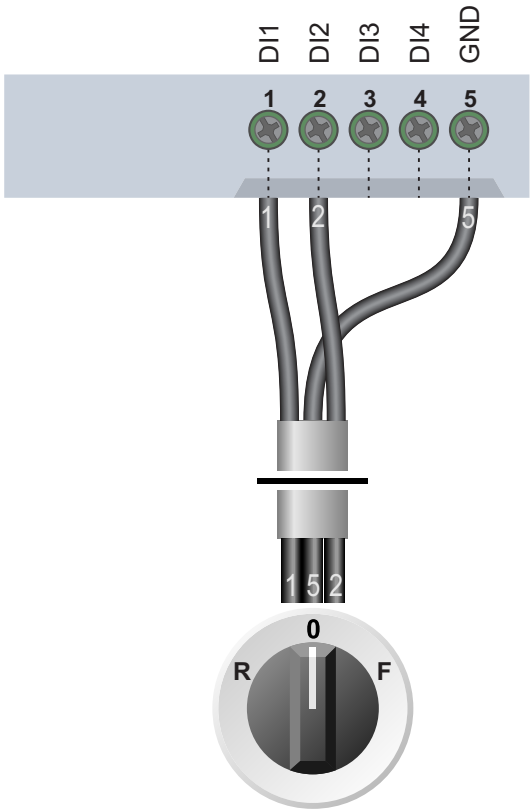
9. How to connect and configure a Run Forward or Run Reverse switch

The procedure described in section 6 enables Run/Stop operation via the red and green button on the Inverter.
If this is unsuitable for the application, a remote switch can be used instead.

This section explains how to enable 2-wire control with Run Forward / Stop / Run Reverse commands via a single selector switch.

9.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P226	REM Rotation Selection	Set value to **4** for DIx.
P227	REM Run/Stop Selection	Set value to **1** for DIx.
P263	Function of Digital Input DI1	Set value to **4** for Forward Run command.
P264	Function of Digital Input DI2	Set value to **5** for Reverse Run command.
P265	Function of Digital Input DI3	Set value to **0** for not used (this is the factory default).
P266	Function of Digital Input DI4	Set value to **0** for not used (this is the factory default).



Switch, 3 Position
Normally Open
"Run Forward / Stop / Run Reverse"
[Order Codes 30147 (x1), 30146 (x2), 30409 (x1)]

9.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite. The GND terminal is a common connection for terminals DI1 and DI2.

A suitable 3 position NO (Normally Open) switch should be installed between terminals DI1, DI2 and GND. The centre position should remain open circuit.

When a connection is made between terminals DI1 and GND, the motor will run forward. When terminals DI2 and GND are connected, the motor will run in reverse.

The motor speed is determined by either P133 (minimum speed) or P121 (local speed ref), whichever is higher.

If terminals DI1 and DI2 are connected to GND at the same time the motor will run in the direction defined by the terminal which was connected first.

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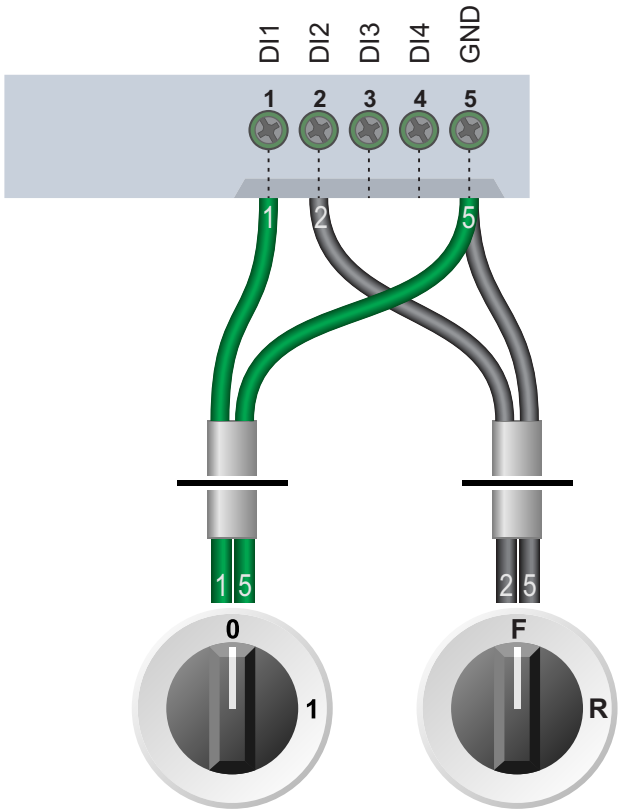
10. How to connect and configure a Run/Stop switch with Forward/Reverse selection

The procedure described in section 6 enables Run/Stop operation via the red and green button on the Inverter.
If this is unsuitable for the application, remote switches can be used instead.

This section explains how to enable 2-wire control with Run/Stop and Forward/Reverse commands via separate selector switches.

10.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P226	REM Rotation Selection	Set value to **4** for DIx.
P227	REM Run/Stop Selection	Set value to **1** for DIx.
P263	Function of Digital Input DI1	Set value to **1** for Run/Stop (this is the default).
P264	Function of Digital Input DI2	Set value to **8** for FWD/REV (this is the factory default).
P265	Function of Digital Input DI3	Set value to **0** for not used (this is the factory default).
P266	Function of Digital Input DI4	Set value to **0** for not used (this is the factory default).



Switch, 2 Position Normally Open "Run / Stop"

Switch, 2 Position Normally Open "Forward / Reverse"

[Order Codes 31557 (x2), 30146 (x2), 30409 (x2)]

10.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. The GND terminal is a common connection for terminals DI1 and DI2.

Two suitable 2 position NO (Normally Open) switches should be installed: One between terminals DI1 and GND (Run/Stop) and the other between terminals DI2 and GND (Forward/Reverse).

The motor speed is determined by either P133 (minimum speed) or P121 (local speed ref), whichever is higher.

Note that the Forward/Reverse switch only selects the direction of rotation - it will not start or stop the motor.

If the application only requires the motor to turn in one direction, the Forward/Reverse switch can be omitted.

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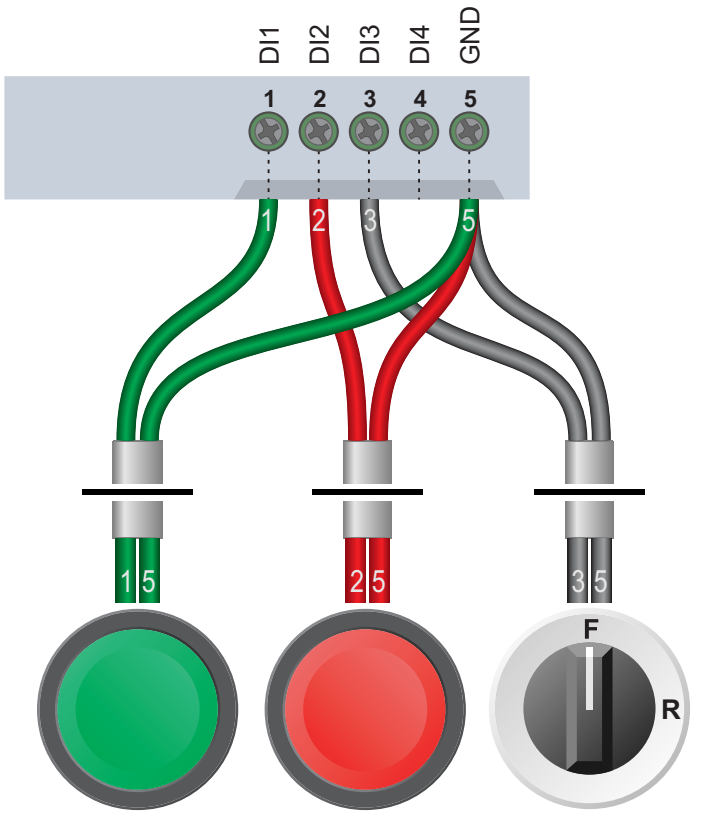
11. How to configure “3-Wire” control with Run/Stop pushbuttons and Forward/Reverse selection

The procedure described in section 6 enables Run/Stop operation via the red and green button on the Inverter.
If this is unsuitable for the application, remote switches can be used instead.

This section explains how to enable 3-wire control with Run and Stop commands via separate pushbuttons and Forward/Reverse selection via a selector switch.

11.1 Parameters to change for remote 3-wire control

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P226	REM Rotation Selection	Set value to **4** for DIx.
P227	REM Run/Stop Selection	Set value to **1** for DIx.
P263	Function of Digital Input DI1	Set value to **6** for Start Command (press P to clear “Conf” message if prompted).
P264	Function of Digital Input DI2	Set value to **7** for Stop Command.
P265	Function of Digital Input DI3	Set value to **8** for FWD/REV.
P266	Function of Digital Input DI4	Set value to **0** for not used (this is the factory default).



Pushbutton Normally Open “Run”

Pushbutton Normally Closed “Stop”

Switch, 2 Position Normally Open “Forward / Reverse”

[Order Codes 29992 (x1), 29989 (x1), 31557 (x1), 30146 (x2), 30477 (x1), 30409 (x3)]

11.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. The GND terminal is a common connection for terminals DI1, DI2 and DI3.

For “Run” and “Stop”, two suitable pushbuttons should be installed. The “Run” pushbutton should include a Normally Open contact between terminals GND and DI1 and the “Stop” a Normally Closed contact between terminals GND and DI2.

For “Forward/Reverse” a suitable 2 position NO (Normally Open) switch should be installed between terminals GND and DI3.

A momentary connection between GND and DI1 will start the motor. It will continue to run until the connection between GND and DI2 is broken.

The motor speed is determined by either P133 (minimum speed) or P121 (local speed ref), whichever is higher.

Note that the Forward/Reverse switch only selects the direction of rotation - it will not start or stop the motor. If the application only requires the motor to turn in one direction, the Forward/Reverse switch can be omitted.

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12. How to reset the Inverter to Factory Defaults

12.1 Press the P key to access parameters

With the motor stopped and any fault or alarm messages cleared, press the P key to access the parameter list.

Note: Fault and alarm messages are prefixed with F or A and can be cleared by pressing the green and red start/stop button once.
If the display is already showing a value prefixed the P proceed to the next step.

12.2 Select parameter P204

The parameter menu will show the currently-selected parameter prefixed with a “P”.

Use the up and down arrows to locate P204. Press the P key to edit this parameter.

12.3 Set the value to 6

Use the arrow keys to change the value from 0 to 6 to load the 50Hz defaults. Press the “P” to accept and save this value.

The display will power-off and a clicking sound from relays inside the Inverter will be heard.

12.4 The Inverter resets

The display will then illuminate with all characters briefly visible before the process completes.

Once the reset is complete, the display will show “rdy” as illustrated in 12.1 (above) to indicate that the Inverter is now ready.

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