INVERTER DRIVE® SUPERMARKET

Easy Start Guide

WEG
CFW-08 Frequency Inverter
available from WEG.InverterDrive.com

This guide is intended to compliment 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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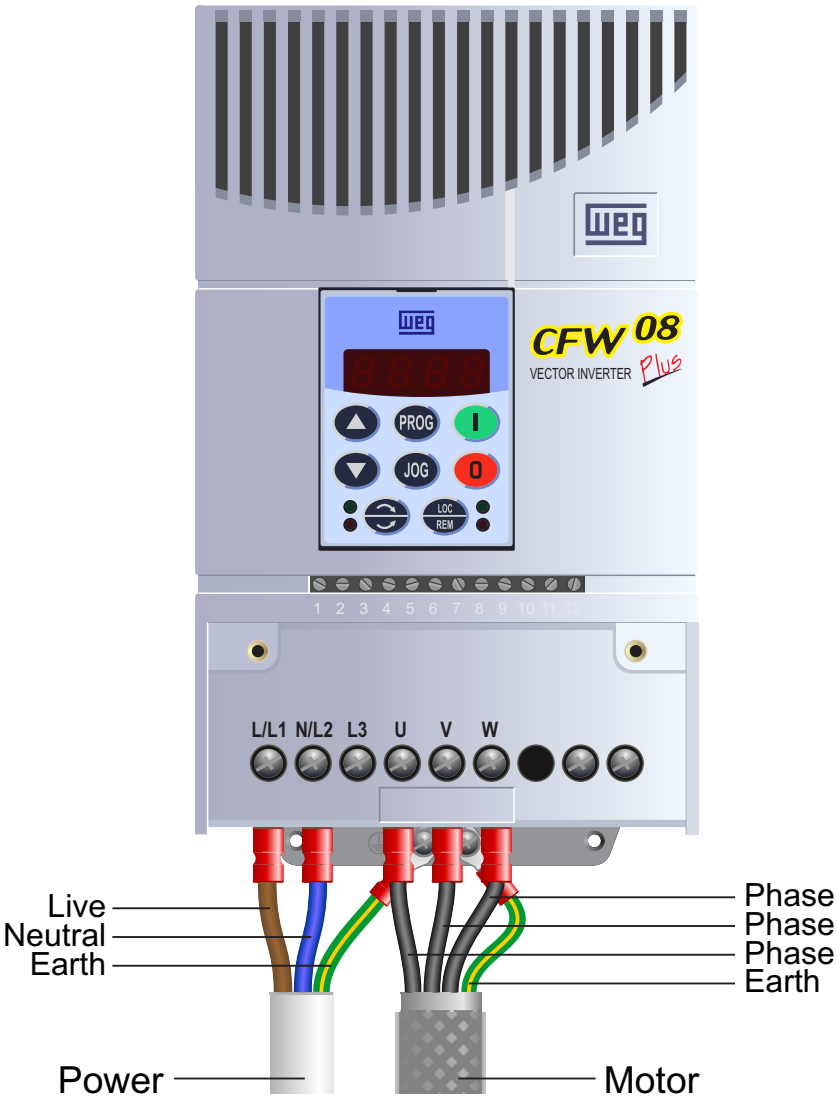
1. Power and Motor Connections (Single Phase)

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 above is based on the frame size 2 rating (1.5kW). The terminal layout for other sizes and the “Wash” model is similar.

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

Important:

Use screened SY cable between the Inverter and Motor to minimise electromagnetic interference.

Ensure the motor cable screen is earthed at the motor end.

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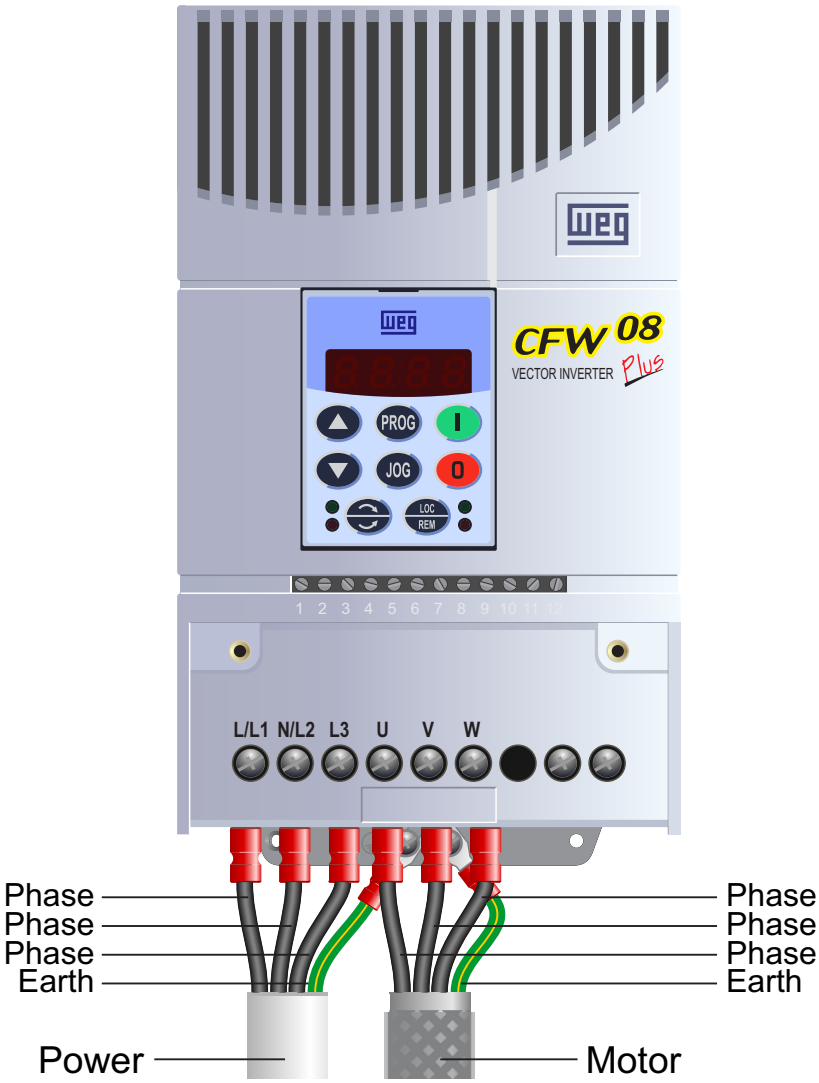
2. Power and Motor Connections (Three Phase)

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 above is based on the frame size 2 rating (1.5kW). The terminal layout for other sizes and the "Wash" model is similar.
The order of the three motor phases determines the direction the motor turns.
The order of the three power phases is unimportant.

Important:

Use screened SY cable between the Inverter and Motor to minimise electromagnetic interference.

Ensure the motor cable screen is earthed at the motor end.

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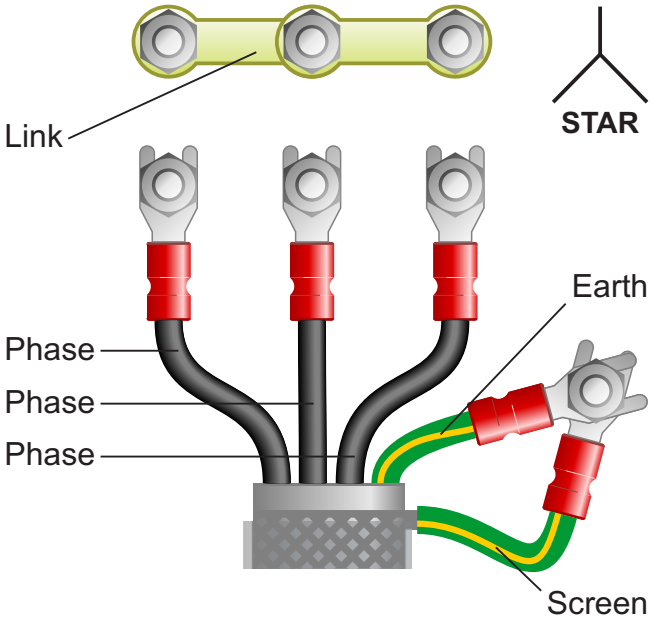
3. Motor Connections - Star and Delta

Dual voltage induction motors typically include terminal boxes with six points. The points 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 an inverted Y (Wye).



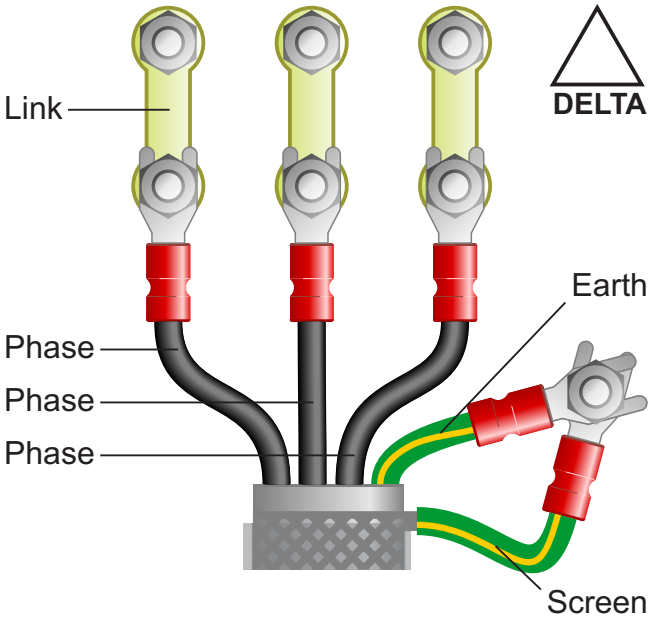
3.1 Motor connected in STAR (or Wye):

For safety purposes, Star (shown opposite) is the default configuration for new motors 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 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 earth terminal.



3.2 Motor connected in DELTA:

The Delta 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 earth terminal.

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4. Parameters - overview

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

Parameters are typically referred to by code or number (eg. P401 = Rated Motor 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 installer before the Inverter is operated for the first time.
The parameters listed in section 5 are intended to provide a starting point to allow for basic operation of the CFW-08 Inverter.

5. Parameters to set before use

Set the following parameters to allow the CFW-08 to control a motor with Run, Stop and Speed Control from the keypad.

If any of the parameters have been changed previously, follow the procedure in section 15 to reset the Inverter to Factory Defaults.

See section 6 to learn how to set a parameter value.

5.1 Parameters to check and values to set

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P100	Acceleration Time (seconds)	Default is **5.0** Increase or decrease if required.
P101	Deceleration Time (seconds)	Default is **10.0** Increase or decrease if required.
P133	Minimum Frequency (Hz)	Default is 3.00. Set to **5.00** for most applications.
P134	Maximum Frequency (Hz)	Default is 55.00 or 66.00. Set to **50.00** for most applications.
P202	Control Mode	Default is **0** (linear). Can be set to 1 (quadratic) if the motor is driving a Fan or Pump.
P399	Rated Motor Efficiency	Set to match motor if known - eg. **71.00 (**%)
P400	Rated Motor Voltage	Set to match motor nameplate - eg. **230**
P401	Rated Motor Current	Set to match motor nameplate - eg. **3.34** (Amps)
P402	Rated Motor Speed	Set to match motor nameplate - eg. **1430** (rpm, look for min -1)
P403	Rated Motor Frequency	Set to match motor nameplate - eg. **50.00** (Hz)
P404	Rated Motor Power	Refer to P404 table in manual and set to match motor nameplate - eg. **6** (for 1.5 kW)
P407	Rated Motor Power Factor	Set to match motor if known - eg. **0.74 (**look for cos φ)

Note: Although some parameters are only used in Sensorless Vector Mode (see Section 9), we recommend that all the above are set.

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6. How to set a Parameter value

6.1 Find the Parameter List.

This example demonstrates the steps required to set parameter P401 which is Rated Motor Current.

With the motor stopped, press the “PROG” button to access the parameter list. The display will show the letter “P” followed by a three digit number. Typically, this is P000 as shown in the illustration opposite.

6.2 Find the Parameter to change

Use the up and down keys to find the required parameter. In this example, P401.

Press the “PROG” key to select the parameter value.

6.3 Set the Parameter Value

Use the up and down keys to set the parameter value as required. In this example, the motor nameplate shows a rated current of 6.47A so the value is set accordingly.

Note: If you are unable to change the value, ensure that parameter P000 is set to 5. Some parameters may be read-only so cannot be changed even when P000 is set to 5.

6.4 Finished.

Press “PROG” to save changes. The display will return to the current parameter.

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7. How to operate the Inverter from the keypad

7.1 Ensure the Inverter is in "Local" control mode.

Press the "Loc/Rem" button repeatedly until the green indicator lamp next to the "Loc/Rem" button is illuminated.

See section 8 for further information on Local and Remote modes.

7.2 Set Parameter P121 to the required speed

Set parameter P121 (Keypad Reference) to the desired speed. In this example, 25.00Hz is half the rated speed for a standard 50Hz Induction Motor. Leave the display showing the speed in Hz.

See section 6 to learn how to set a parameter value.

7.3 Start the motor and change direction

Press the green button to start the motor. The motor will accelerate to the required speed in the time specified by parameter P100. Use the up and down keys to change the speed as required.
Pressing the direction button (see illustration opposite) will first decelerate the motor to zero speed before accelerating up to the current speed in the opposite direction. Parameters P100 and P101 control the acceleration and deceleration time in seconds. The lamps on the left indicate direction; green = forward, red = reverse.

7.4 Stop the motor

Press the red button to stop the motor. The motor will decelerate to a stop in the time specified by parameter P101.

Once stopped, the display will show "rdy" (ready).

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8. How to switch from Local (keypad) control to Remote (terminal) control and back

8.1 Local (keypad) control

When the green indicator lamp next to the “Loc/Rem” button is illuminated, the Inverter is in “Local” mode.

When in “Local” mode, the motor can be controlled using the integrated keypad. The defaults are:-

Start/Stop, Speed Up/Down, Forward/Reverse rotation, Jog

8.2 Remote (terminal) control

When the red indicator lamp next to the “Loc/Rem” button is illuminated, the Inverter is in “Remote” mode.

When in “Remote” mode, the motor can be controlled using the terminal block.

8.3 Toggle between Local and Remote control

Press the “Loc/Rem” button again to toggle from Local to Remote or from Remote to Local.

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9. How to enable Sensorless Vector Mode

The standard operating mode of the CFW-08 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 CFW-08 can also operate in Sensorless Vector mode. This can improve motor performance without requiring a separate feedback device.

In order to improve performance, Sensorless Vector builds a “model” of the motor it is controlling. This is achieved by a “tuning” run during which the Inverter operates for approx. 2 minutes to gather the necessary motor data.

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. Invoking a “tuning” run in these cases will not be successful and return an E14 error.

9.1 Parameters to check and values to set

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P202	Control Mode	Default is 0 (linear). Set to **2** to enable Sensorless Vector Control.
P408	Run Self-Tuning	Default is 0. Ensure motor is off-load before changing to **1** to begin self-tuning.

The display will flash “auto” whilst the CFW-08 performs it’s tuning run.

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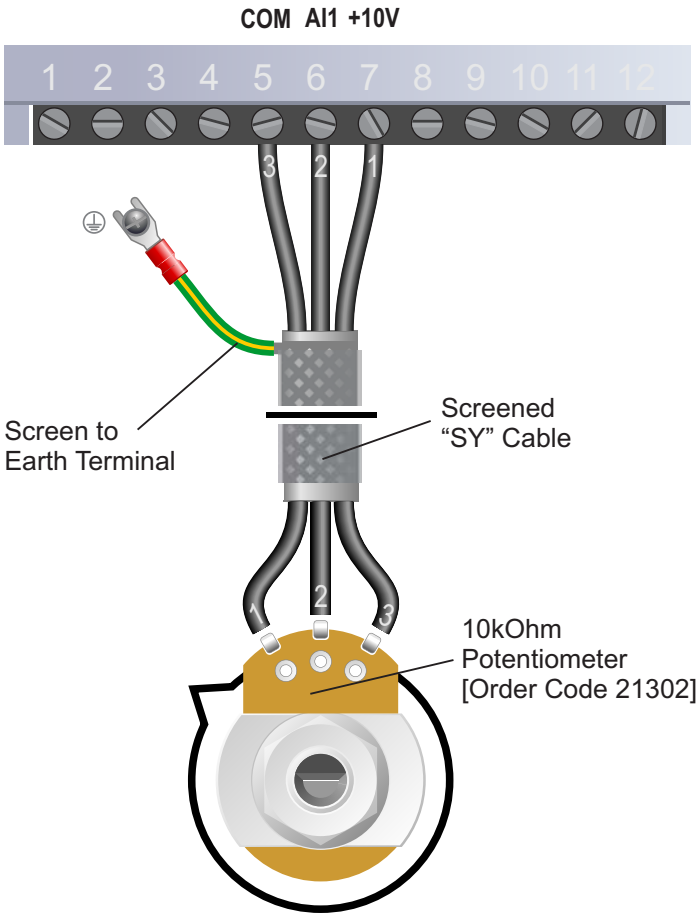
10. How to connect and configure a Potentiometer for remote speed control

If the up/down buttons on the keypad are unsuitable for the application, a remote Potentiometer can be used instead.
This provides the benefit of allowing motor speed to be controlled from a more convenient location such as a cabinet door (if the CFW-08 is cabinet-mounted) or on the machine itself.

A Potentiometer of **10kOhm** rating should be used. The number of turns depends on the application but both single turn and ten turn Potentiometers are available from The Inverter Drive Supermarket at InverterDrive.com.
Ensure the Inverter is in "Remote" mode before continuing.

10.1 Parameters to change for remote Potentiometer speed control

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P221	Frequency Local Reference	Set to **0** to use the keypad up/down keys or 1 to enable the Potentiometer in Local mode
P222	Frequency Remote Reference	Set to **1** to enable the Potentiometer via AI1 in Remote mode
P133	Minimum Frequency	Set to **5** for Potentiometer lowest speed of 5Hz (or set as required)
P134	Maxmum Frequency	Set to **50** for Potentiometer highest speed of 50Hz (or set as required)
P233	Analog Input Dead Zone	Set to **0** to set 0V to min speed and 10V to max speed so full Potentiometer rotation is used
P235	Analog Input AI1 Function	Set to **0** to enable 0-10V (check S1:3 DIP switch behind keypad is off)



10.2 Connecting the Potentiometer

A wiring diagram is shown in the illustration opposite. The most important connection at the Potentiometer end is the centre terminal or "wiper".

The wiper will output a variable voltage between 0 and 10 volts and should be connected to terminal 6 at the Inverter end. It is this voltage which provides the speed signal with 0V being slowest and 10V fastest.

Set the Potentiometer at its "half-way" position before running the motor for the first time. If the rotation of the Potentiometer is the opposite to that required (ie. turn anti-clockwise to increase speed instead of clockwise) reverse connections +10V and COM.

Use shielded SY cable between Potentiometer and Inverter and ensure that the cable screen is connected to the Inverter earth terminal.

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

The parameters described in Section 5 enable Run/Stop operation via the red and green buttons on the Inverter.

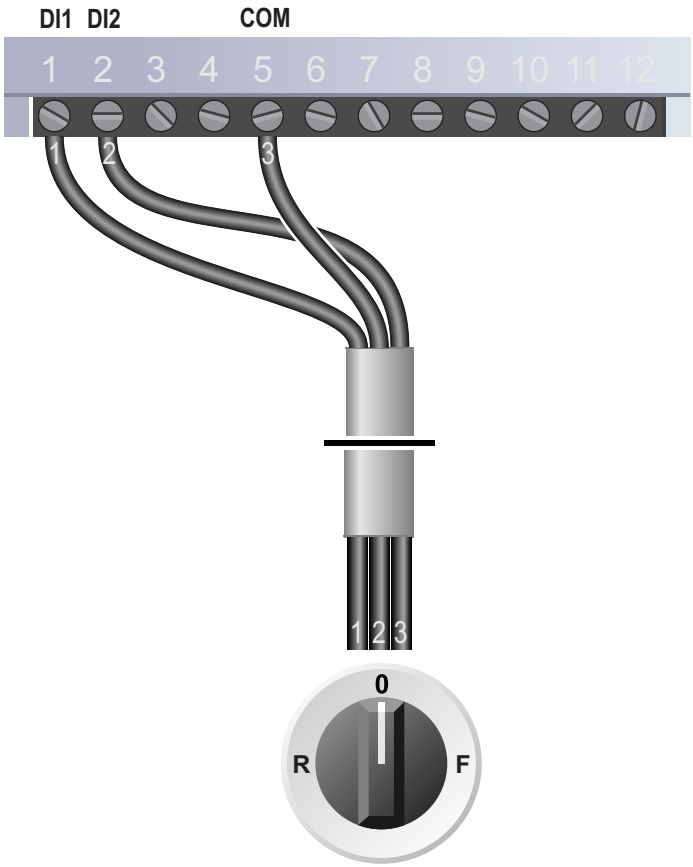
If this is unsuitable for the application, a remote switch can be used instead.

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

Ensure the Inverter is in "Remote" mode before continuing.

11.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P230	Remote Command Selection	Set to **1** to use the Inverter terminals (as opposed to keypad)
P263	Digital input 1 (T1) function	Set to **8** for Forward Run on T1 (ignore E24 error, will clear when P264, P265, P266 are set)
P264	Digital input 2 (T2) function	Set to **8** for Reverse Run on T2
P265	Digital input 3 (T3) function	Set to **10** for reset on T3 (or set to 1, 3, 6, 11, 12, 13 or 15 as required but no other values)
P266	Digital input 4 (T4) function	Set to **3** for run Jog on T4 (or set to 1, 6, 11, 12, 13, 14 or 15 as required but no other values)



Switch, 3 Position
Normally Open
"Run Forward / Stop / Run Reverse"

11.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite.

Terminal 5 (COM) is a common connection for terminals 1-4, 6 and 8 and has no other function.

A suitable 3 position NO (Normally Open) switch should be installed between terminals 1 (DI1), 2 (DI2) and 5 (COM). The centre position should remain open circuit.

When a connection is made between terminals 1 (DI1) and 5 (COM), the motor will run forward. When terminals 2 (DI2) and 5 (COM) are connected, the motor will run in reverse.

Care should be taken to ensure that terminals 1 (DI1) and 2 (DI2) cannot be connected to 5 (COM) at the same time or to each other.

If motor rotation is the opposite to that required, simply swap connections 1 and 2.

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

The parameters described in Section 5 enable Run/Stop operation via the red and green buttons on the Inverter.

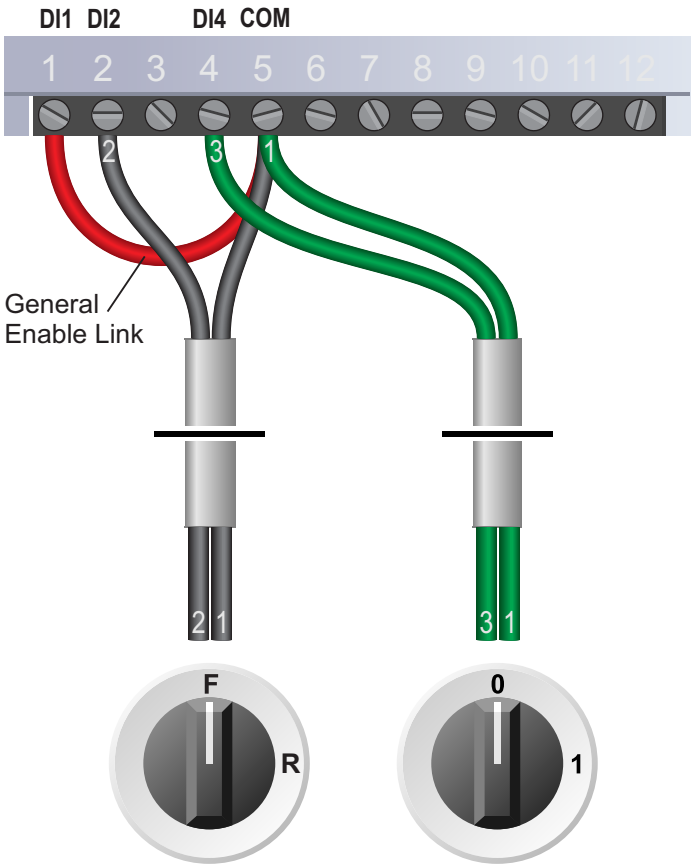
If this is unsuitable for the application, remote switches can be used instead.

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

Ensure the Inverter is in "Remote" mode before continuing.

12.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P230	Remote Command Selection	Set to **1** to use the Inverter terminals (as opposed to keypad)
P263	Digital input 1 (T1) function	Set to **0** for "General Enable" on T1
P264	Digital input 2 (T2) function	Set to **0** for Forward/Reverse on T2
P265	Digital input 3 (T3) function	Set to 1**0** for reset on T3 (or set to 1, 3, 6, 11, 12, 13 or 15 as required but no other values)
P266	Digital input 4 (T4) function	Set to **8** for Start/Stop on T4



Switch, 2 Position Normally Open "Forward / Reverse"

Switch, 2 Position Normally Open "Run / Stop"

12.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite.

Terminal 5 (COM) is a common connection for terminals 1-4, 6 and 8 and has no other function.

Two suitable 2 position NO (Normally Open) switches should be installed: One between terminals 4 and 5 (Run/Stop) and the other between terminals 2 and 5 (Forward/Reverse).

A "General Enable" link is required between terminals 1 and 5. If this link is removed whilst the motor is running, the motor will coast to a stop (rather than controlled deceleration).

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

The parameters described in Section 5 enable Run/Stop operation via the red and green buttons on the Inverter.

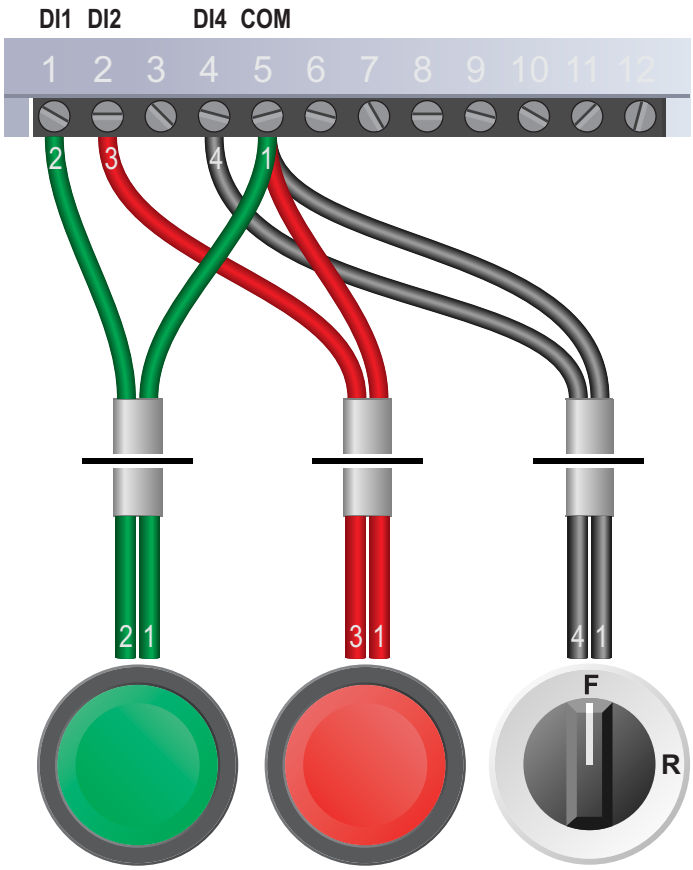
If this is unsuitable for the application, remote switches can be used instead.

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

Ensure the Inverter is in “Remote” mode before continuing.

13.1 Parameters to change for remote 3-wire control

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P230	Remote Command Selection	Set to **1** to use the Inverter terminals (as opposed to keypad)
P263	Digital input 1 (T1) function	Set to **14** for 3-wire control “Start” on T1 (ignore E24 error, will clear when P264 is set)
P264	Digital input 2 (T2) function	Set to **14** for 3-wire control “Stop” on T2
P265	Digital input 3 (T3) function	Set to **10** for reset on T3 (or set to 1, 3, 6, 11, 12, 13 or 15 as required but no other values)
P266	Digital input 4 (T4) function	Set to **0** for forward/reverse selection on T4



Pushbutton Normally Open “Run”

Pushbutton Normally Closed “Stop”

Switch, 2 Position Normally Open “Forward / Reverse”

13.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. Terminal 5 (COM) is a common connection for terminals 1-4, 6 and 8 and has no other function.

For “Run” and “Stop”, two suitable pushbuttons should be installed. The “Run” pushbutton should include a Normally Open contact between terminals 5 (COM) and 1 (DI1) and the “Stop” a Normally Closed contact between terminals 5 (COM) and 2 (DI2).
For “Forward/Reverse” a suitable 2 position NO (Normally Open) switch should be installed between terminals 5 (COM) and 4 (DI4).

A momentary connection between 5 (COM) and 1 (DI1) will start the motor. It will continue to run until the connection between 5 (COM) and 2 (DI2) is broken.

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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14. Brake Resistor Connection

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.

High inertia loads can cause overvoltage trips during deceleration and lead to “E01" error messages. In many cases, the solution is to increase the deceleration time to compensate.

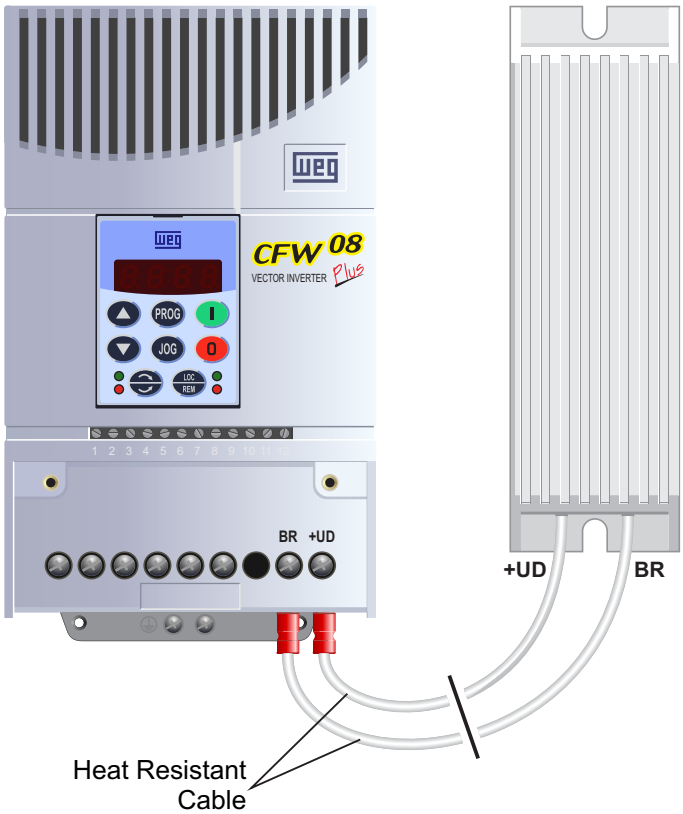
However, if the application requires it, dynamic braking can be used to maintain or reduce deceleration times by absorbing the energy generated by such loads.

A Brake Resistor is first installed to absorb braking energy and dissipate it as heat. The resistor must be correctly sized for both the Inverter and application.

A “brake chopper” within the Inverter detects excessive braking energy and redirects it to the resistor as required.

14.1 Parameters to change for Dynamic Braking

Parameter	Description	How to set
P000	Parameter Access	Set to **5** to allow parameters to be changed
P151	DC Link Voltage Regulation Level	Set to **380** for 230V Inverter or **780V** for 400V Inverter (default values).



14.2 Connecting the Resistor

A wiring diagram is shown in the illustration opposite. Connect the brake resistor to the BR and +UD Terminals on the Inverter. The order of the connections is unimportant.

The braking resistor may get hot during operation. Ensure that it is mounted in a suitable position away from other items.

It is important that a resistor of the correct rating is used. Consult the manufacturer’s manual or product listing on InverterDrive.com for further information.

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15. How to reset the Inverter to Factory Defaults

15.1 Select Parameter P000

With the motor stopped, press the “PROG” button to select parameters. The display will show the letter “P” followed by a three digit number. Use the up and down keys to select P000 if it is not already selected.

15.2 Set Parameter P000 to 5

Press the “PROG” button again to select the parameter value. Use the up and down keys to set this value to 5. Press “PROG” again to save. The display will return to P000.

Note: setting P000 to 5 allows other parameters to be changed.

15.3 Select Parameter P204

Use the up and down keys to select P204. Press the “PROG” button to see the current value (typically “0").

15.4 Set Parameter P204 to 5

Use the up and down keys to change the value to 5. Press “PROG” again to save. The display will flash briefly and change from 5 back to 0. Press “the “PROG” button to return to P000.

Note: setting P204 to 5 will reset the Inverter back to factory defaults. This will also reset P000 back to 0. Ensure that you set P000 to 5 before attempting to change any other parameters.

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