INVERTER DRIVE® SUPERMARKET

WEG CFW300 Frequency Inverter

Easy Start Guide



The WEG CFW300 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 (size A)



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 frame size A (ratings less than 2.2kW). The terminal layout for frame B is different and is shown on the next page.

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. Power and Motor Connections (size B)



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 frame size B (2.2kW ratings). The drive cover has been removed for clarity. The terminal layout for frame size A is different (see previous page).

Frame size B can be used with either a single phase or three phase 230V supply. For single phase connect Live and Neutral as illustrated. For three phase connect the phases to L1, L2 and L3.

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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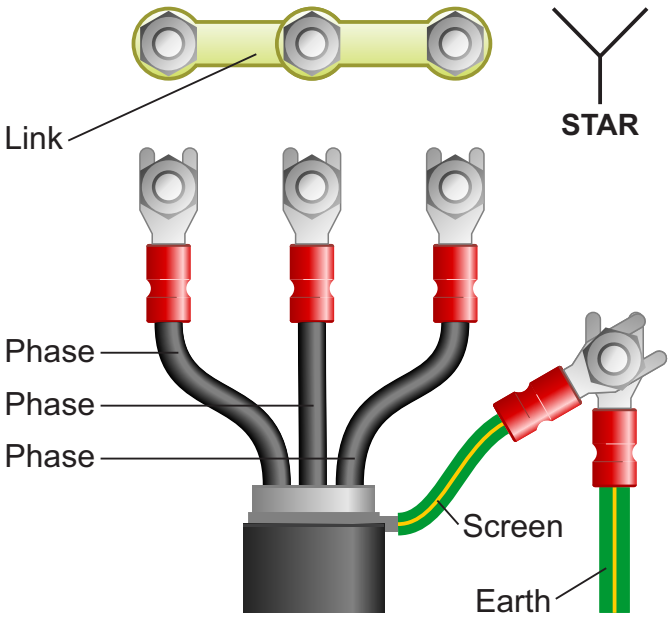
3. Motor Connections - Star and Delta

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 a Y (Wye).



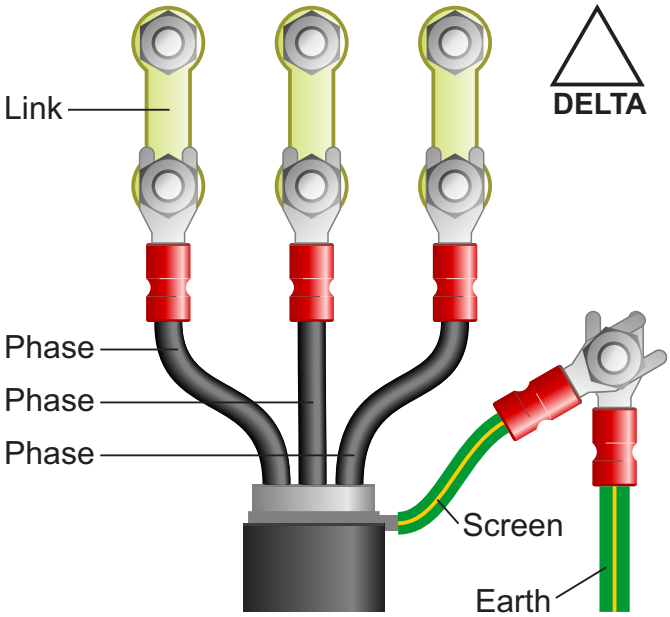
3.1 Motor connected in STAR (or Wye):

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 back in future.

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

Note that the manufacturer recommends that the cable screen is earthed at both ends and the motor and Inverter are earthed separately.



3.2 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 manufacturer recommends that the cable screen is earthed at both ends and the motor and Inverter are earthed separately.

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4. 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 5 are intended to provide a starting point to allow for basic operation of the CFW300 Inverter.

5. Parameters to set before use

Set the following parameters to allow the CFW300 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 14 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
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 with default settings).
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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6. How to set a Parameter value



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 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.



6.3 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.



6.4 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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7. How to operate the Inverter from the keypad



7.1 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.



7.2 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.



7.3 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.



7.4 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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8. How to enable Sensorless Vector Mode (VVW)

The standard operating mode of the CFW300 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 CFW300 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.

8.1 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)
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.
P178	Rated Flux (%)	Normally ok to leave at the default value of **100%**.



8.2 Start Autotune.

Once the parameters in 8.1 have been set, locate parameter P408 and set it to 1.

The Autotune process will begin.

Note: if parameter P202 is not set correctly, the autotune process will not start. Check the parameters in 8.1 above before setting P408 to 1.



8.3 The Autotune process.

During the autotune process, the display will show “AUTO”. The motor shaft will not turn but a high-pitched excitation sound will be heard for a few seconds. The bars at the bottom of the display indicate progress.

The autotune process sets parameter P409 (stator resistance) which would otherwise be set to the default value. Once complete, the display will show “rdy”.

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

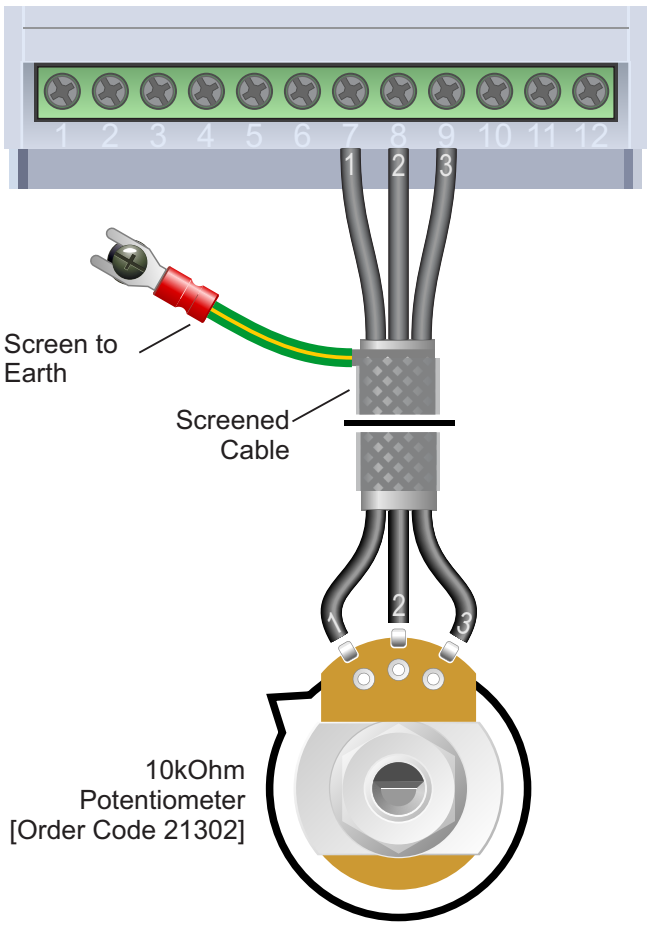
If speed control via the integrated keypad is unsuitable for the application, a remote Potentiometer can be used instead.
This provides the benefit of allowing motor speed to be controlled from a more convenient location such as a cabinet door (if the CFW300 is cabinet-mounted) or on the machine itself.

A potentiometer rated at **10kOhm** should be used.

The number of turns depends on the application. A single turn Potentiometer is available from The Inverter Drive Supermarket at InverterDrive.com.

9.1 Relevant parameters for remote Potentiometer speed control

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P222	REM Frequency Reference	Set value to **1** for Analogue Input
P227	REM Run/Stop Selection	Set value to **1** for Digital Input or 0 for the keypad.
P263	Function of Digital Input DI1	Set value to **1** for Run/Stop (this is the factory default).



9.2 Connecting the Switches

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 8 (AI1) on the Inverter. It is this voltage which provides the speed signal with 0V being slowest and 10V fastest.

The default output frequency at 0V is the minimum frequency of the Inverter. To change this, edit Parameter P133 (default is 3Hz). The default output frequency at 10V is 50Hz. To change this, edit Parameter P134.

If the rotation of the Potentiometer is the opposite to that required (ie. turn anti-clockwise to increase speed instead of clockwise) reverse connections 7 (GND) and 9 (+10V).

Use shielded cable between Potentiometer and Inverter and ensure that the cable screen is earthed.

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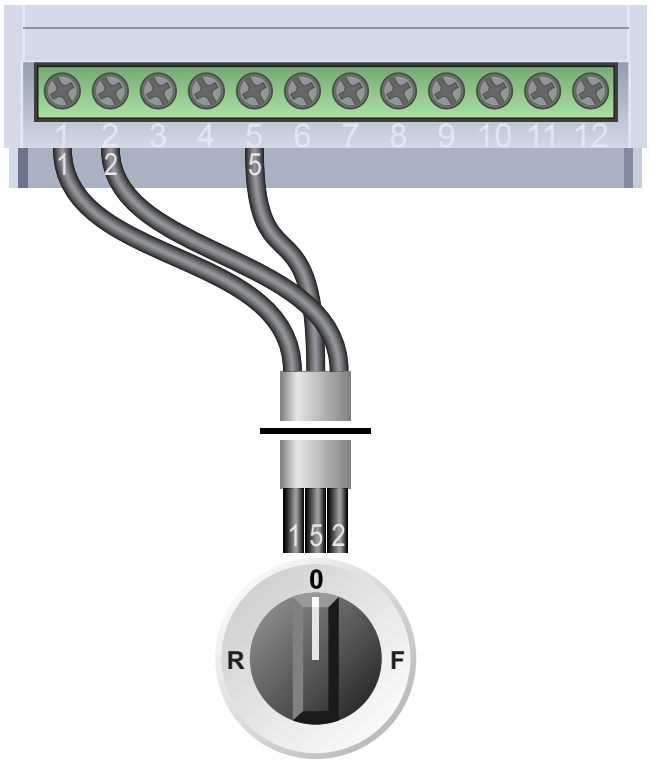
10. How to connect and configure a Run Forward or Run Reverse switch

The procedure described in section 7 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.

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.
P222	REM Frequency Ref	Set to 0 for keypad or **1** for Analogue input as described in section 9.
P226	REM Rotation Selection	Set value to **4** for DIx (Digital input direction control).
P227	REM Run/Stop Selection	Set value to **1** for DIx (Digital input run/stop control).
P263	Function of Digital Input DI1	Set value to **4** for Forward Run command (press P to clear "Conf" message if shown).
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, 30409 and 30146]

10.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite. Terminal 5 (GND) is a common connection for terminals 1 (DI1) and 2 (DI2).

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

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

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

If terminals 1 (DI1) and 2 (DI2) are connected to terminal 5 (GND) at the same time the motor will run in the direction defined by the terminal which was connected first.

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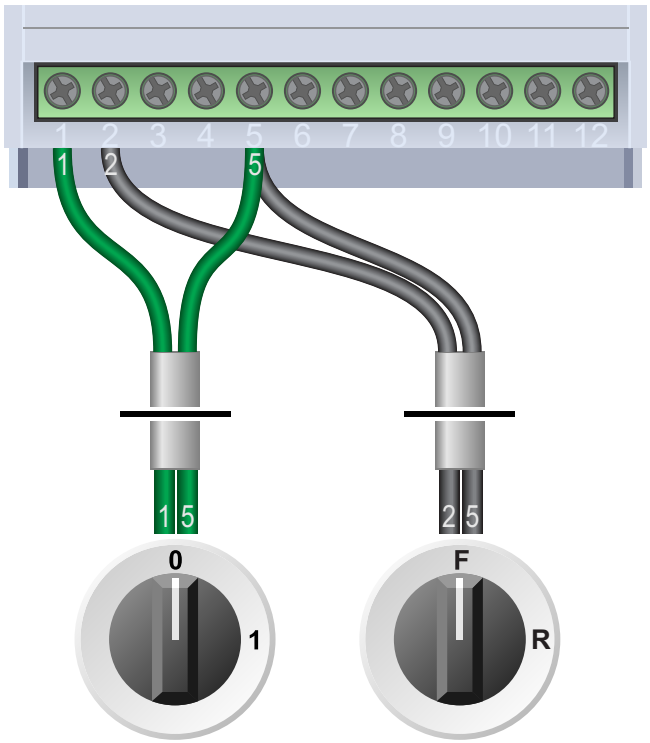
11. How to connect and configure a Run/Stop switch with Forward/Reverse selection

The procedure described in section 7 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.

11.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P222	REM Frequency Ref	Set to 0 for keypad or **1** for Analogue input as described in section 9.
P226	REM Rotation Selection	Set value to **4** for DIx (Digital input direction control).
P227	REM Run/Stop Selection	Set value to **1** for DIx (Digital input run/stop control). Press P to clear Conf message if shown.
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, 30409 and 30146 each]

11.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. Terminal 5 (GND) is a common connection for terminals 1 (DI1) and 2 (DI2).

Two suitable 2 position NO (Normally Open) switches should be installed: One between terminals 1 (DI1) and 5 (GND) for run/stop and the other between terminals 2 (DI2) and 5 (GND) for forward/reverse).

The motor speed is determined by either P133 (minimum speed), P121 (local speed ref) or Analogue input (remote 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. When running, the direction is indicated on the Inverter display (top left).

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

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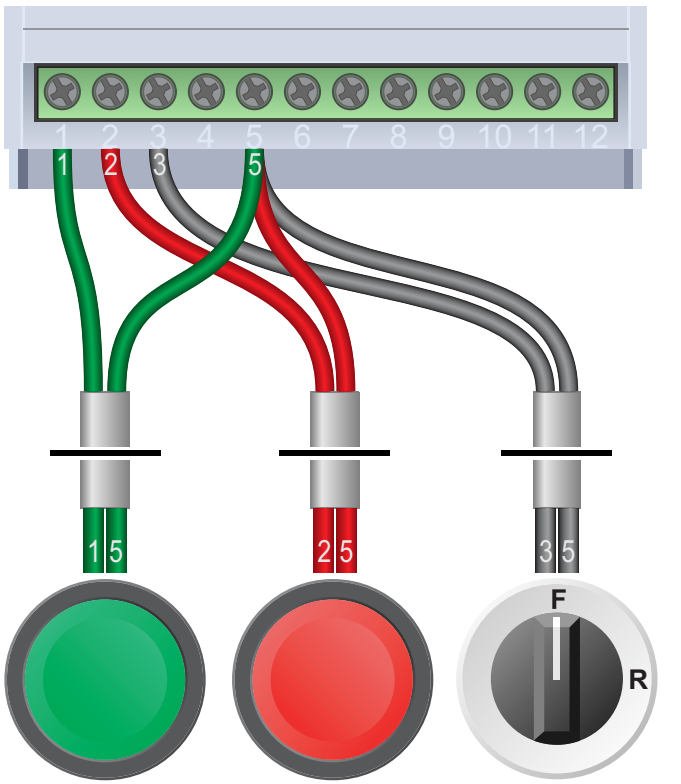
12. How to configure “3-Wire” control with Run/Stop pushbuttons and Forward/Reverse selection

The procedure described in section 7 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.

12.1 Parameters to change for remote 3-wire control

Parameter	Description	How to set
P220	LOC/REM Selection Source	Set to **1** for Always Remote.
P222	REM Frequency Ref	Set to 0 for keypad or **1** for Analogue input as described in section 9.
P226	REM Rotation Selection	Set value to **4** for DIx (Digital input direction control).
P227	REM Run/Stop Selection	Set value to **1** for DIx (Digital input run/stop control).
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, 29989, 31557, 30409 x 3, 30477, 30146 x 2]

12.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. Terminal 5 (GND) is a common connection for terminals 1 (DI1), 2 (DI2) and 3 (DI3).

For “Run” and “Stop”, two suitable pushbuttons should be installed. The “Run” pushbutton should include a Normally Open contact between terminals 1 (DI1) and 5 (GND) and the “Stop” a Normally Closed contact between terminals 2 (DI2) and 5 (GND).

For “Forward/Reverse” a suitable 2 position NO (Normally Open) switch should be installed between terminals 3 (DI3) and 5 (GND).
A momentary connection between DI1 and GND will start the motor. It will continue to run until the connection between DI2 and GND is broken.

The motor speed is determined by either P133 (minimum speed), P121 (local speed ref) or Analogue input (remote 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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13. Brake Resistor Connection (size B only)

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 “F022" error messages. In many cases, the solution is to increase the deceleration time to compensate.

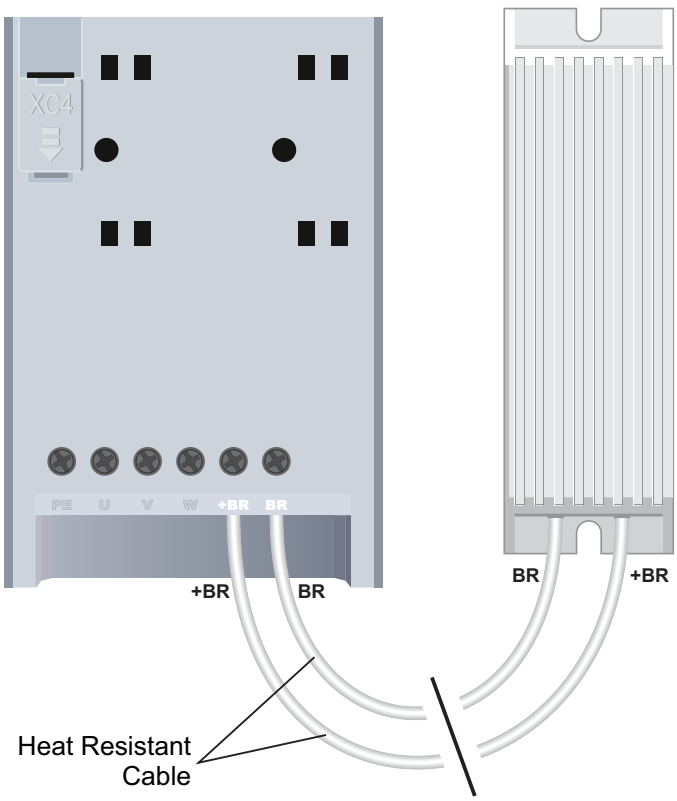
However, if the application requires it, dynamic braking can be enabled to maintain or reduce deceleration times by absorbing the energy generated by such loads.

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.

Then, the “brake chopper” within the Inverter is enabled. This detects excessive braking energy and redirects it to the resistor when required.

13.1 Relevant parameters for Dynamic Braking

Parameter	Description	How to set
P0153	Dynamic Braking Actuation	Default is **365V** which is suitable for most applications. Can be increased to a maximum of 410V if required to ensure braking is activated before an “overvoltage” trip.



13.2 Connecting the Resistor

A wiring diagram is shown in the illustration opposite. Connect the brake resistor to the +BR and BR 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 at least 10cm 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.

Note: Dynamic braking is available on frame size B CFW300 Inverters only.

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14. How to reset the Inverter to Factory Defaults



14.1 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.



14.2 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.



14.3 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.



14.4 The Inverter resets

The display will then go blank before the process completes.

Once the reset is complete, the display will show “rdy” as illustrated in 14.1 (above) to indicate that the Inverter is now ready.

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