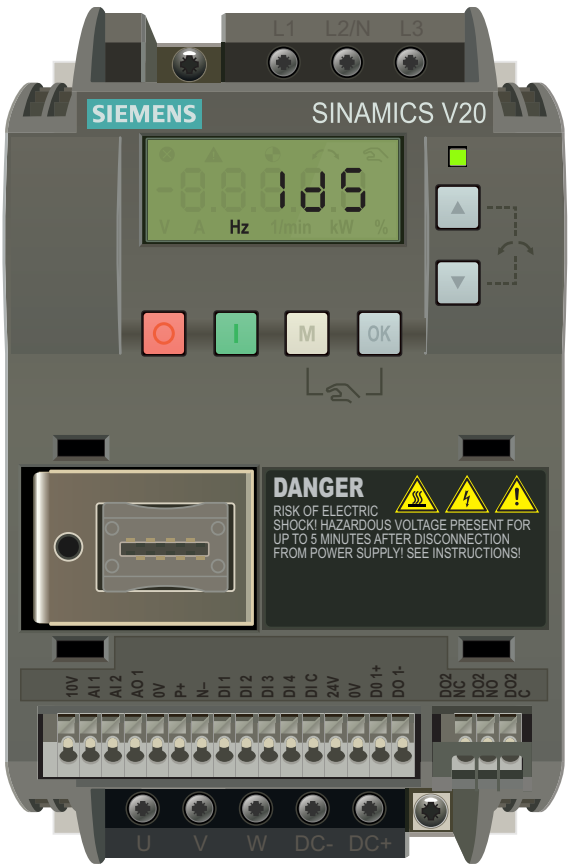
INVERTER DRIVE® SUPERMARKET

Siemens V20 Frequency Inverter

Easy Start Guide



The Siemens V20 Frequency Inverter range is available to order from 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.

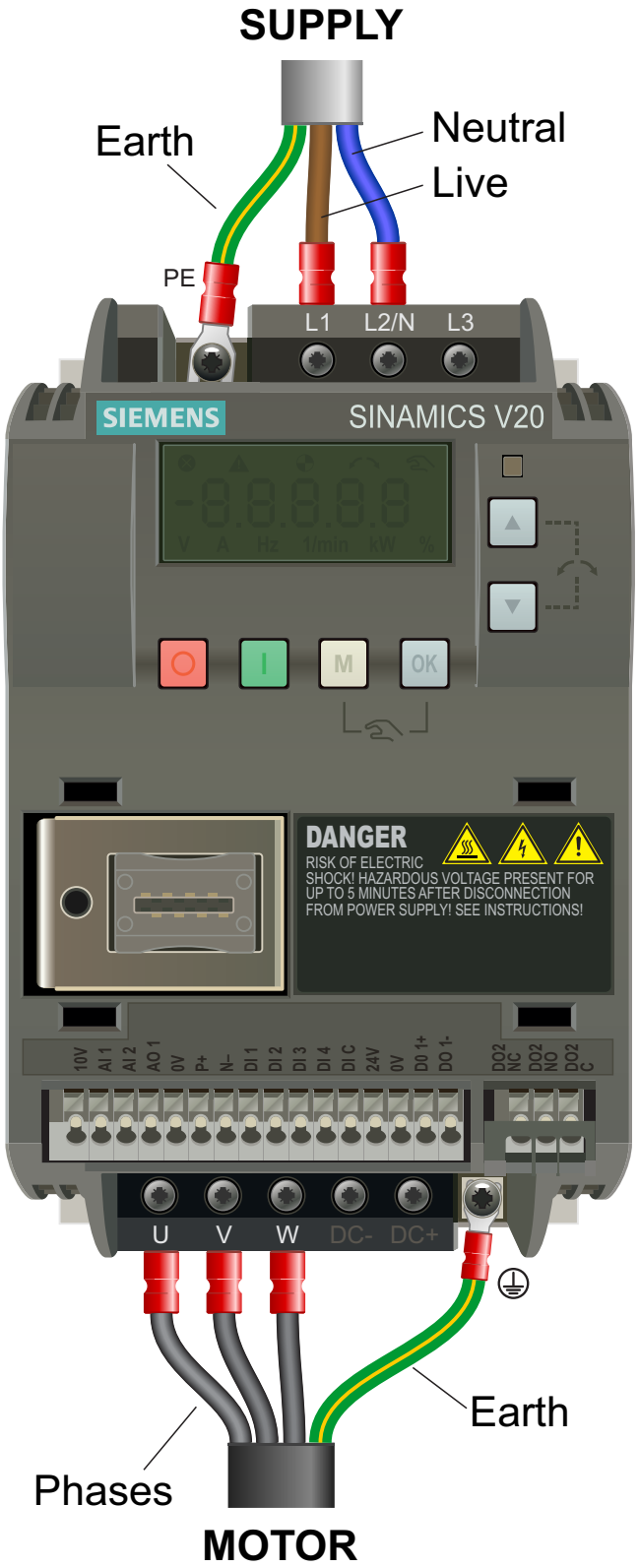
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1. Power and Motor Connections (Single Phase)



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:

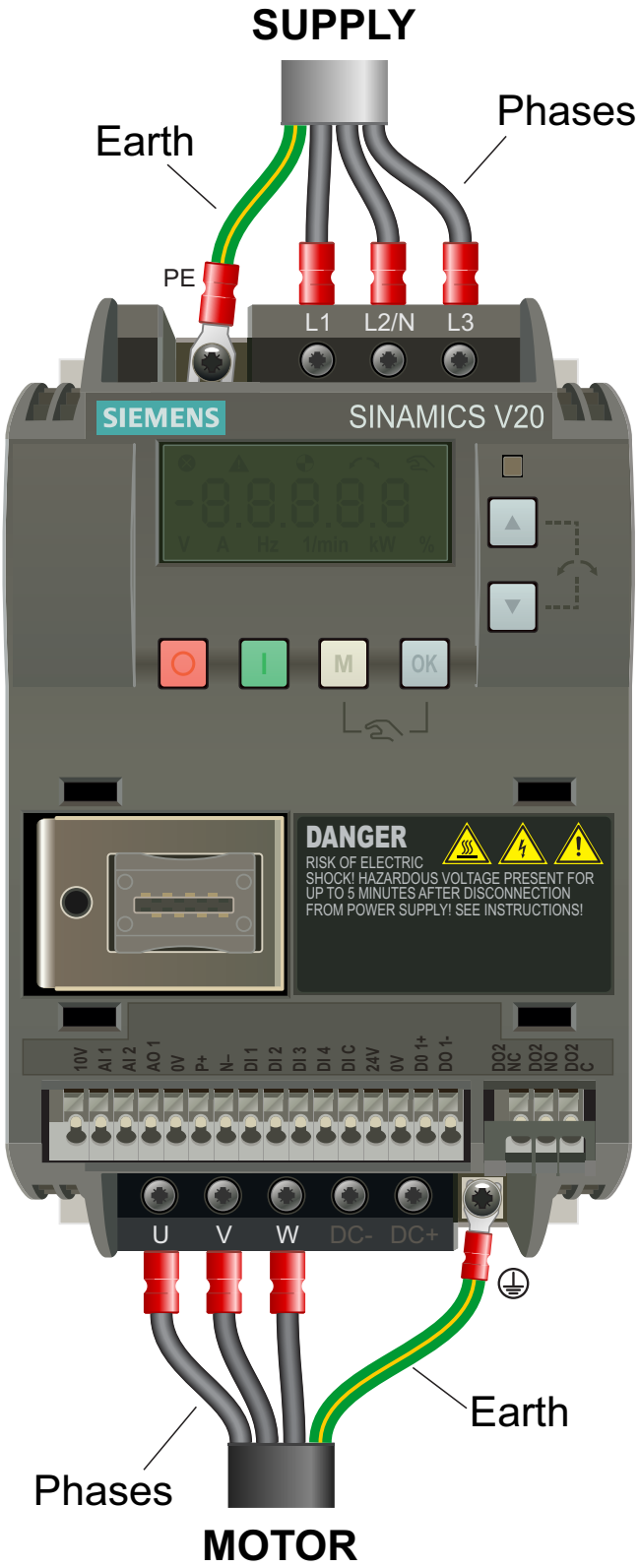
The illustration on the left is based on the smaller 230V Single Phase frame size model (to 0.75kW). The terminal layout for larger frame sizes is similar.

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

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

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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 on the left is based on the smaller 400V Three Phase frame size model (to 0.75kW). The terminal layout for larger frame sizes is similar.

The order of the three supply phases is unimportant.

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

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

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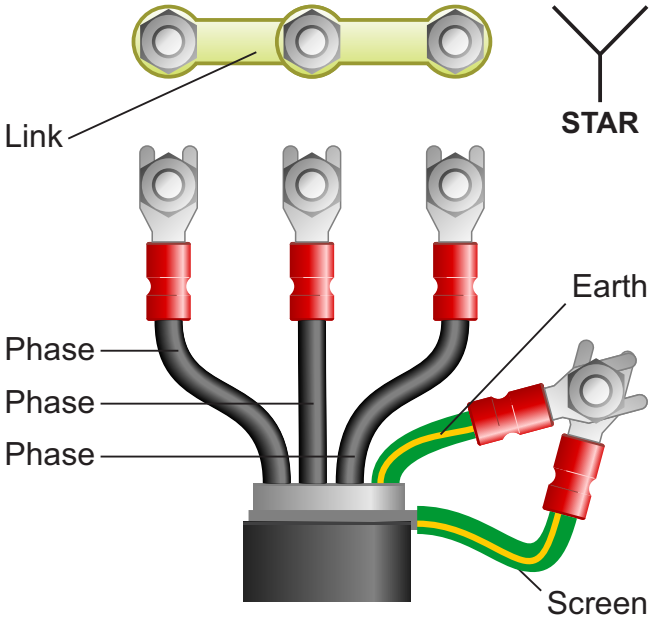
3. Motor Connections - Star and Delta

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).



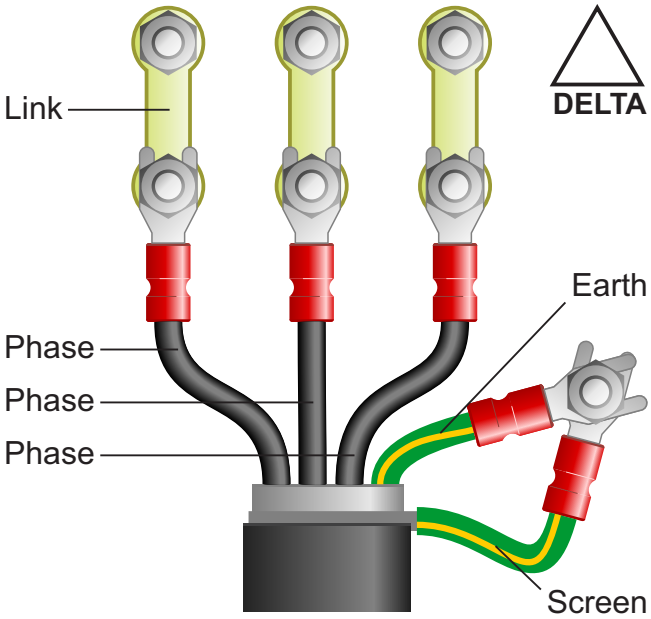
3.1 Motor connected in STAR (or Wye):

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 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.



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 cable screen and earth are connected together at the motor 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 in a wide range of applications. These settings are known as parameters.

Parameters are typically referred to by code or number (eg. P0305 = 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 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 V20 Inverter.

5. Parameters to set before use

Set the following parameters to allow the V20 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 6 to learn how to set a parameter value.

5.1 Parameters to check and values to set

Parameter	Description	How to set
P0010	Commissioning parameter	Set to **1** to enable quick commissioning.
P0100	Europe / North America	Set to **0 for Europe, kW, 50Hz**. 1 for North America (NA), hp, 60Hz or 2 for NA, kW, 60Hz.
P0304	Motor rated voltage (V)	Set to **400** for a 400V motor or **230** for 230V to suit motor rating plate and terminal wiring.
P0305	Rated motor current (A)	Rated current of the *Motor*. Set to match motor nameplate and wiring - eg. **3.34 Amps.**
P0307	Rated motor power (kW/hp)	Rated power of the *Motor*. Set to match motor nameplate in kW or hp depending on P0100.
P0308	Rated motor power factor (cosφ)	Rated power factor of the *Motor*. Enter cosφ value.
P0310	Rated motor frequency (Hz)	Set to match motor nameplate - normally **50Hz for Europe**.
P0311	Motor rated speed (rpm)	Set to match motor nameplate approx. **1400 for 4 pole**, 2800 for 2 pole etc.
P0010	Commissioning parameter	Set to **0** to indicate that commissioning is complete.
P0003	User access level	Set to **2** to allow access to extended parameters.
P1080	Minimum motor frequency (Hz)	Set to **5** for most applications. Can be set to the desired Hz for fixed speed applications.
P1082	Maximum motor frequency (Hz)	Set to **50** for most applications.
P1120	Ramp-up time (s)	Time in seconds to accelerate from zero to maximum frequency. Default is 10.
P1121	Ramp-down time (s)	Time in seconds to decelerate from maximum frequency to zero. Default is 10.
P1032	Inhibit reverse setpoint selection	Change to **0** if forward and reverse selection via keypad is required.

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6. How to set a Parameter value



6.1 Press the M key to access parameters.

With the motor stopped and from the status menu (see illustration on the left), press the M key to access the parameter menu.

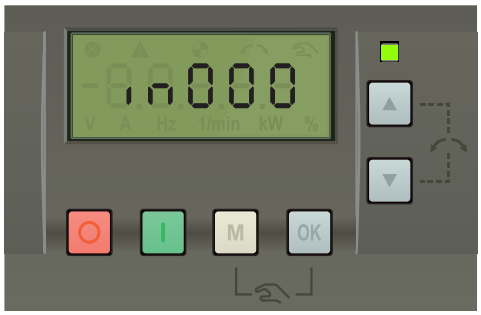
Note: To access the status menu from another menu press and hold the M key for 2 seconds.



6.2 Select the required parameter.

Use the up and down arrows to locate the parameter you wish to change - in this case, P0305 motor rated current.
Press the OK key to select it.
Press the OK key again to select index in000 if prompted.

Note: If you are unable to locate the required parameter it may be hidden. Change P0003 to 2 to enable extended parameter access.



6.3 Select the Index (if prompted).

Some parameters contain multiple values which are “indexed” as part of a set. This allows the V20 to be configured for use in more than one application as a set can be selected.

If only one application is required, simply press the OK key to accept the default index of in000 as shown in the illustration opposite.



6.4 Change the parameter value.

Use the up and down arrow keys to change the value as required. Press the OK to save the changes.
Press and hold the M key for 2 seconds to return to the status menu.

Note: Depending on the value, pressing and holding either the up or down key will change the value in larger

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7. How to operate the Inverter from the keypad



7.1 Locate frequency in the status menu.

Press the OK button repeatedly to cycle through Output Voltage (V), Output Current (A) and DC Bus Voltage (V) until you reach Output frequency (Hz). Hz will be displayed at the bottom of the screen as shown opposite.

Note: To reach the status menu from another menu, press and hold the M button for 2 seconds.



7.2 Press the green I button to start the motor.

The green button will start the motor. Ensure it is safe to do so before proceeding. When the motor is running, a circular icon will be displayed as shown opposite.

Note: The time taken (in seconds) to reach maximum speed is determined by parameter P1120. The time taken to reach less than maximum speed will be proportional to this.



7.3 Changing speed and direction.

The up and down keys increase or decrease the speed. Pressing the key will change the speed in small increments, holding the key will change the speed in larger increments.

Press the up and down keys together to change direction. The arrows icon (shown in the illustration opposite) indicates when the motor is running in reverse. Note that reverse direction is not enabled by default. Change P1032 to 0 to enable it.



7.4 Press the red button (labelled O) to stop the motor.

The red button will stop the motor. The circular run icon is no longer displayed.

Note: The time taken (in seconds) to stop the motor from maximum speed is determined by parameter P1121. The time taken from a less than maximum speed will be proportional.

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

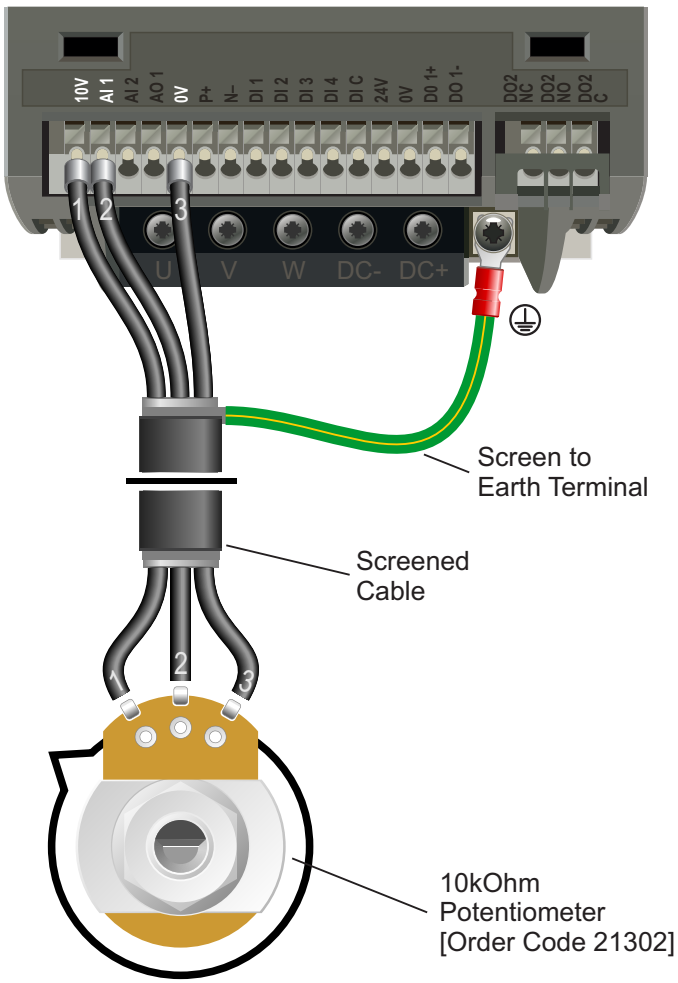
If speed control via the up and down keys is unsuitable for the application, a remote Potentiometer can be used instead.
This provides the benefit of allowing motor speed to be controlled from a more convenient location such as a cabinet door (if the V20 is cabinet-mounted) or on the machine itself.

A Potentiometer of more than 5kOhm rating should be used eg. **10kOhm**.

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.

8.1 Parameters to change for remote Potentiometer speed control

Parameter	Description	How to set
P0003	User access level	Set to **2** to allow access to extended parameters.
P1000	Selection of frequency	Set value to **2** for Analog as speed setpoint (select index **in000** first if prompted).



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

The default output frequency at 10V is determined by parameter P2000. The default output frequency at 0V is determined by P0758 as a percentage of P2000.

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 0V.

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

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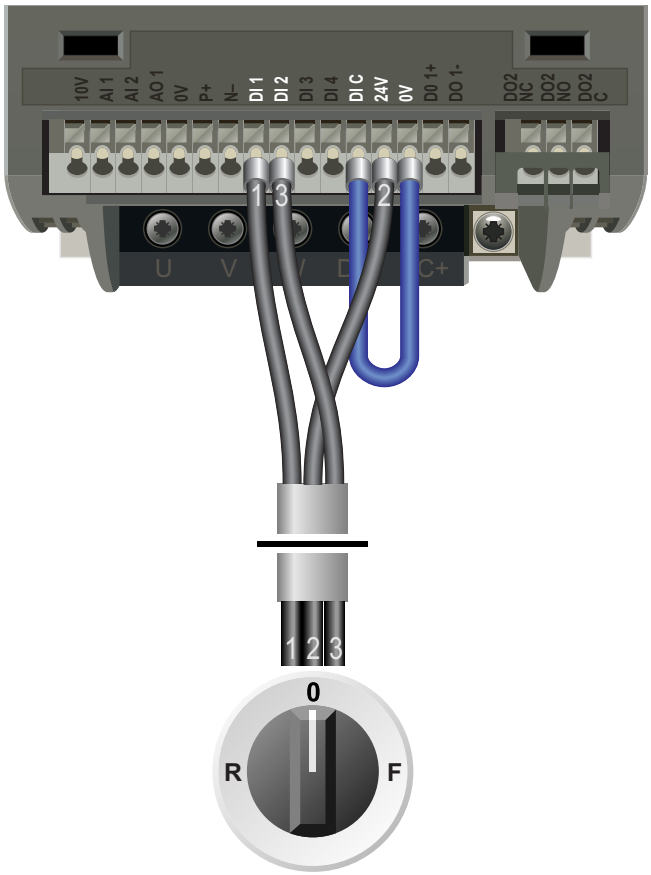
9. How to connect and configure a Run Forward or Run Reverse switch

The procedure described in Section 7 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.

9.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P0003	User access level	Set to **2** to allow access to extended parameters.
P0700	Selection of command source	Set value to **2** for terminals as command source (select index **in000** first if prompted).
P0701	Function of digital input 1	Set value to **2** for ON reverse (select index **in000** first if prompted).
P0702	Function of digital input 2	Set value to **1** for ON (select index **in000** first if prompted).
P0727	Selection of 2/3-wire method	Set value to **1** to enable 2-wire (fwd / rev) control (select index **in000** first if prompted).



Switch, 3 Position
Normally Open
“Run Forward / Stop / Run Reverse”
[Order Codes 21720 and 21690 x 2]

9.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite. The 24V terminal is a common connection for terminals DI1 and DI2. Note that DIC and 0V must be linked (blue wire).

A suitable 3 position NO (Normally Open) switch should be installed between terminals DI1, DI2 and 24V. The centre position should remain open circuit.

When a connection is made between terminals DI2 and 24V, the motor will run forward. When terminals DI1 and 24V are connected, the motor will run in reverse.

If terminals DI1 and DI2 are connected to 24V at the same time the motor will stop.

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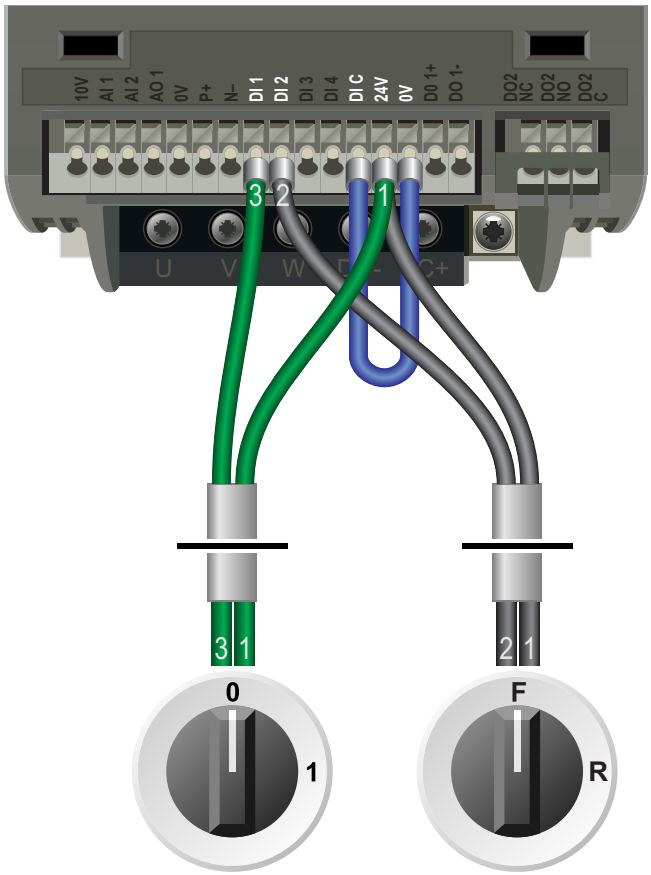
10. How to connect and configure a Run/Stop switch with Forward/Reverse selection

The procedure described in Section 7 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.

10.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
P0003	User access level	Set to **2** to allow access to extended parameters.
P0700	Selection of command source	Set value to **2** for terminals as command source (select index **in000** first if prompted).
P0701	Function of digital input 1	Set value to **1** for ON (select index **in000** first if prompted).
P0702	Function of digital input 2	Set value to **12** for reverse selection (select index **in000** first if prompted).
P0727	Selection of 2/3-wire method	Set value to **1** to enable 2-wire (fwd / rev) control (select index **in000** first if prompted).



Switch, 2 Position
Normally Open
“Run / Stop”

Switch, 2 Position
Normally Open
“Forward / Reverse”

[Order Codes 21725 and 21690 each]

10.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite. The 24V terminal is a common connection for terminals DI1 and DI2. Note that DIC and 0V must be linked (blue wire).

Two suitable 2 position NO (Normally Open) switches should be installed: One between terminals DI1 and 24V (Run/Stop) and the other between terminals DI2 and 24V (Forward/Reverse).

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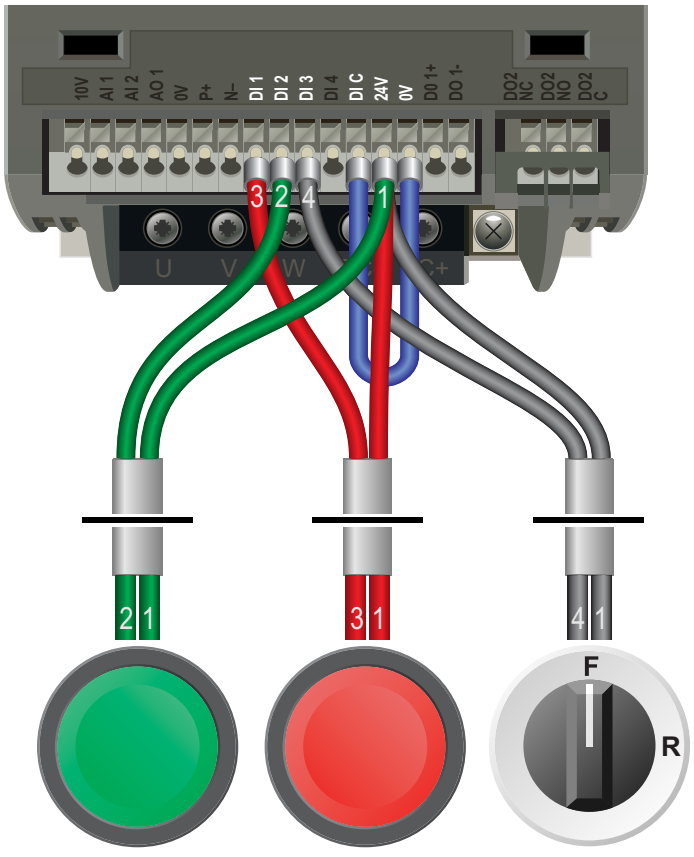
11. How to configure “3-Wire” control with Run/Stop pushbuttons and Forward/Reverse selection

The procedure described in Section 7 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 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
P0003	User access level	Set to **2** to allow access to extended parameters.
P0700	Selection of command source	Set value to **2** for terminals as command source (select index **in000** first if prompted).
P0701	Function of digital input 1	Set value to **2** for OFF1/hold (select index **in000** first if prompted).
P0702	Function of digital input 2	Set value to **1** for ON pulse (select index **in000** first if prompted).
P0703	Function of digital input 3	Set value to **12** for reverse selection (select index **in000** first if prompted)..
P0727	Selection of 2/3-wire method	Set value to **3** for 3-wire control with fwd/rev selection (select index **in000** first if prompted)..



Pushbutton Normally Open “Run”

Pushbutton Normally Closed “Stop”

Switch, 2 Position Normally Open “Forward / Reverse”

[Order Codes 21689, 21688, 21725, 21694, 21690 x 2]

11.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. The 24V terminal is a common connection for terminals DI1, DI2 and DI3. Note that DIC and 0V must be linked (blue wire).

For “Run” and “Stop”, two suitable pushbuttons should be installed. The “Run” pushbutton should include a Normally Open contact between terminals 24V and DI2 and the “Stop” a Normally Closed contact between terminals 24V and DI1.

For “Forward/Reverse” a suitable 2 position NO (Normally Open) switch should be installed between terminals 24V and DI3. A momentary connection between 24V and DI2 will start the motor. It will continue to run until the connection between 24V and DI1 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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12. How to reset the Inverter to Factory Defaults



12.1 Set the Commissioning Parameter to “Factory Settings”.

With the motor stopped and from the status menu, press the M key to access the parameter list. Use the up and down keys to find P0010 and press the OK key to select it. **Change the value to 30** and press the OK key again to save the changes.

Note: To access the status menu from another menu press and hold the M key for 2 seconds.



12.2 Enable “Factory Reset”.

Use the up and down arrows to locate P0970. Press the OK key and **change the value to 21**. Press the OK key again to save the changes.

The display will flash 8888 in sequence whilst the Inverter is resetting.



12.3 Select 50 or 60 Hz.

Once the reset is complete, the display will prompt for 50Hz (as shown opposite). This can be changed to 60Hz with power in hp or 60Hz with power in kW using the up and down keys if required.

Press the M button to confirm the frequency.



12.4 The Status Menu

All parameter values have now been reset.

The display will show one of 5 values such as output frequency in Hz as shown opposite. Press OK to cycle through each value if required.

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