

Easy Start Guide



Bosch Rexroth
EFC 3600 Frequency Inverter
available from Rexroth.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.



Important

This guide covers the Bosch Rexroth EFC3600 only
It is not suitable for use with the EFC3610
or any other product range.

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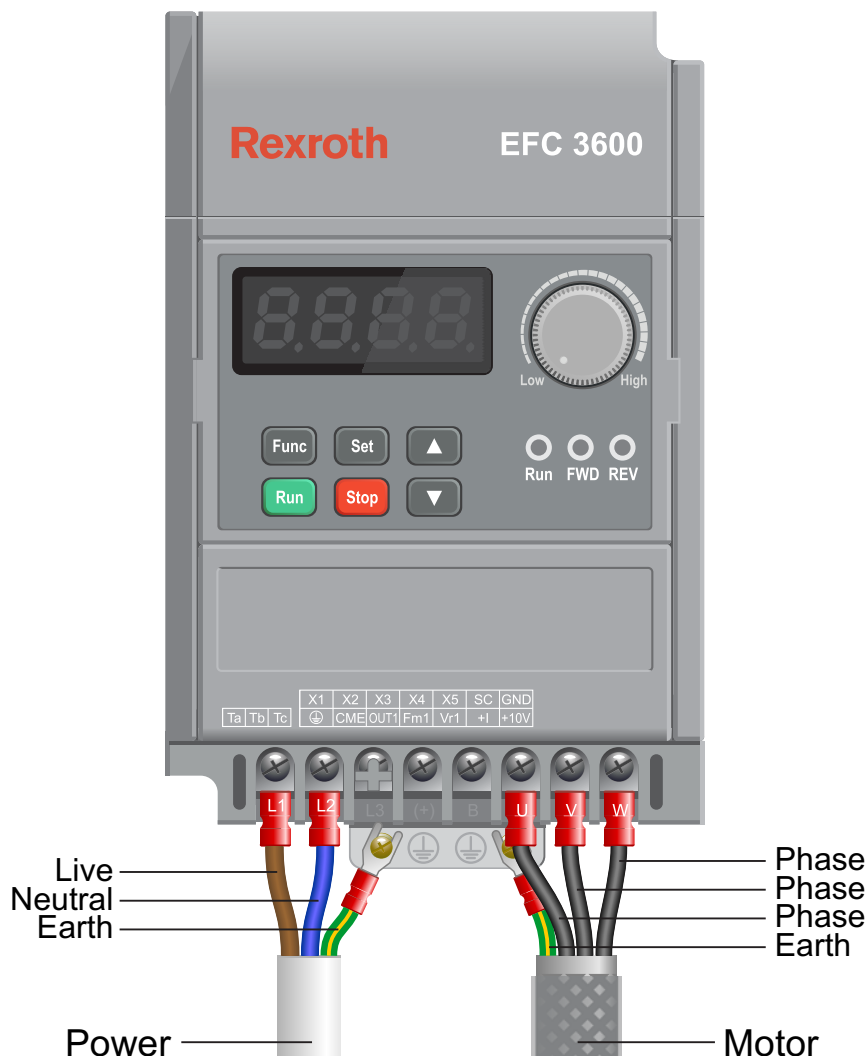
Easy Start Guide

Bosch Rexroth EFC 3600 Series Inverter

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 B model (0.75kW). The terminal layout for sizes A, C and D (0.37kW, 1.5kW and 2.2kW) 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.

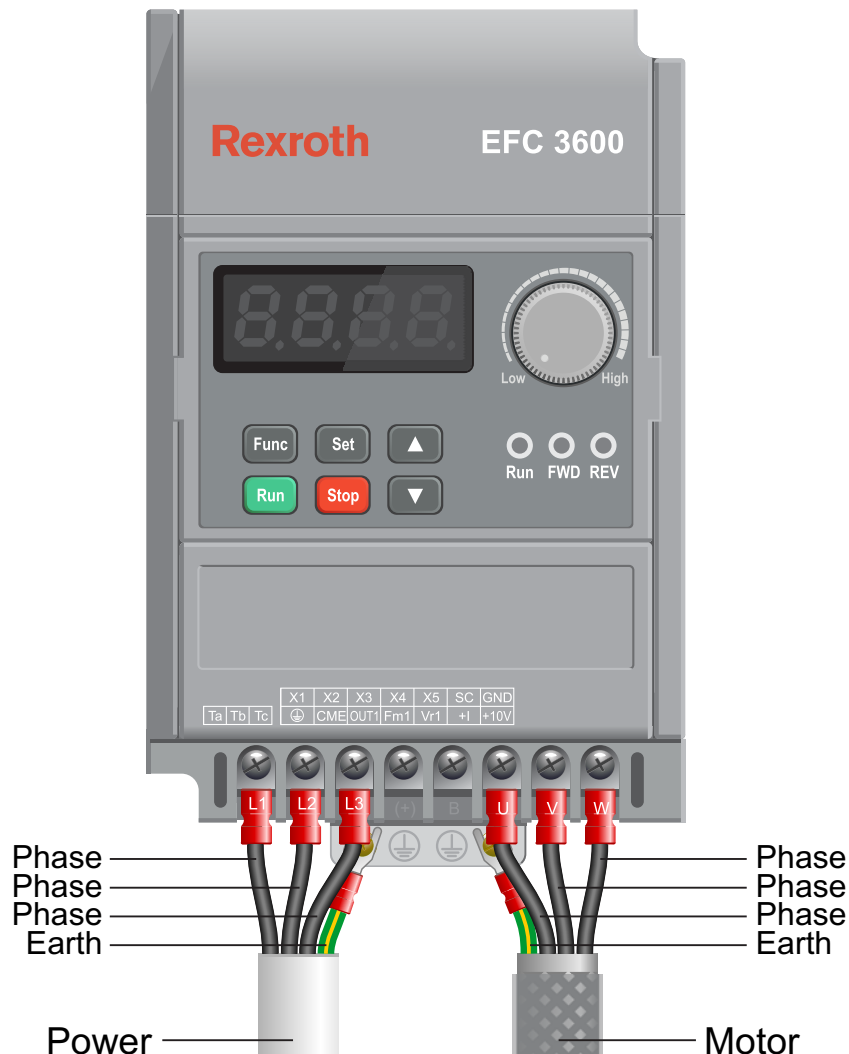
Easy Start Guide

Bosch Rexroth EFC 3600 Series Inverter

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 B model (0.75kW). The terminal layout for other frame sizes 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.

3. Motor Connections - Star and Delta

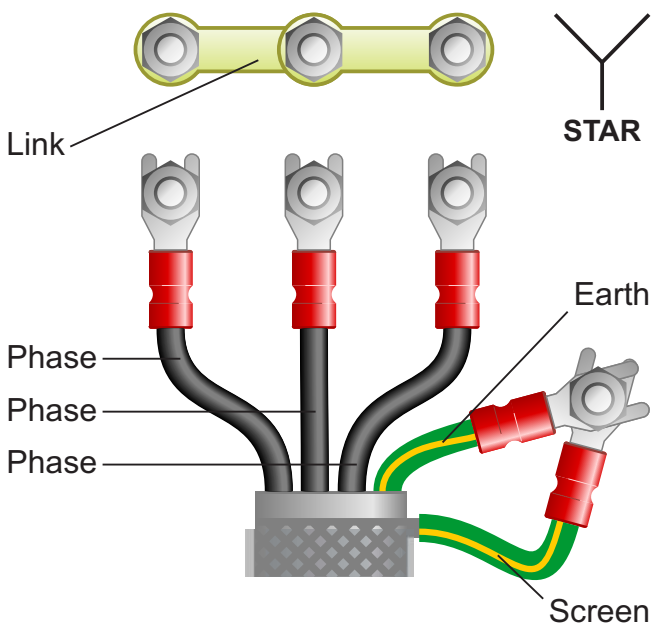
Dual voltage induction motors typically include terminal boxes with six points. The points can be connected together with links in one of two ways to suit one of the two rated voltages.

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).



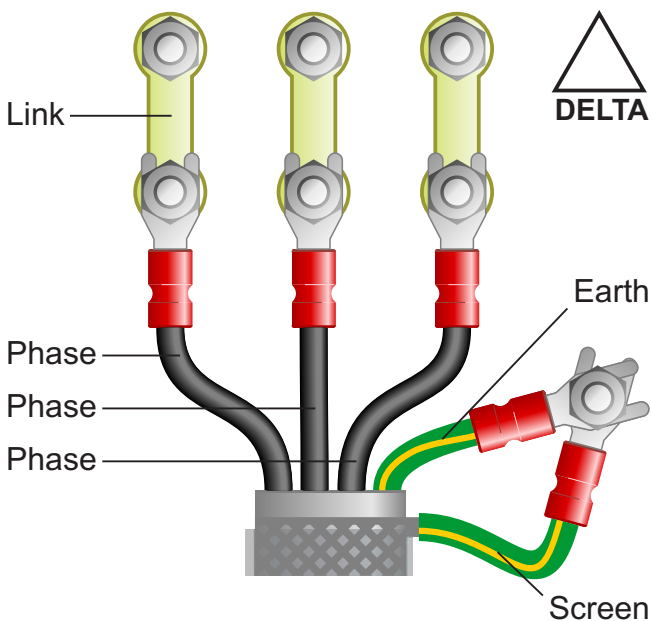
3.1 Motor connected in STAR (or Wye):

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

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. s2.04 = 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 EFC 3600 Inverter.

5. Parameters to set before use

Set the following parameters to allow the EFC 3600 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 13 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
b0.02	Access to additional parameters	Set at 2 to enable Extended Parameters (Default is 0 for Basic Parameters).
b1.05	Maximum Frequency	Maximum frequency of the <i>Inverter</i> . Set to 50.00 for most applications.
b1.06	Upper Frequency	Maximum frequency of <i>speed reference</i> (eg. <i>keypad dial</i>). Set to 50.00 for most applications.
b1.07	Minimum Frequency	Set to 05.00 for most applications (Default is 00.00).
b1.08	Lower frequency mode	Set to 1 to enable Minimum Frequency.
b1.20	Acceleration ramp in seconds	Default is 5 . Increase or decrease if required.
b1.21	Deceleration ramp in seconds	Default is 5 . Increase or decrease if required.
S0.00	V/F curve mode	Default is 0 . Set to 1 if the motor is driving a Fan or Pump.
S2.00	Rated motor frequency in Hz	Default is 50.00. Change to 60.00 for 60Hz motor only - otherwise set at 50.00
S2.01	Rated motor speed in rpm	Set to match motor nameplate - eg. 1380
S2.02	Rated motor power in kW	Set to match motor nameplate - eg. 0.8 (for 0.75kW)
S2.03	Rated motor voltage	Set to match motor nameplate - eg. 230
S2.04	Rated motor current in A	Set to match motor nameplate - eg. 3.34

6. How to set a Parameter value



6.1 Find Parameter Groups.

This example demonstrates the steps required to set parameter b1.05 which is Maximum Frequency.

Press the "Func" key repeatedly until the display shows "-b0-" (shown in the illustration opposite).



6.2 Find a Parameter Group eg. b1

There are a total of 12 parameter groups when "Advanced Parameters" are enabled:-



Some parameter groups may be hidden when "Advanced Parameters" are not enabled. Press "Set" to select "-b1-".



6.3 Find a Parameter eg. b1.05

The display will show "b1.00" to indicate parameter 00 within group b1.

Use the up and down keys to navigate to parameter b1.05. Press the "Set" key to modify the parameter value.

Note that in some cases, the value of a parameter can be restricted by the value of another parameter.



6.4 Change a Parameter value.

Use the up and down keys to increase or decrease the value. Press and hold the up or down key to change the value more quickly.

Press the "Set" key to save changes. The display will show the next available parameter.

Press "Func" twice to exit.

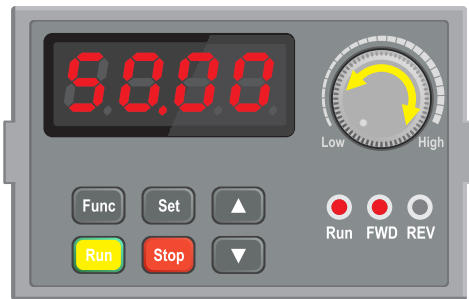
7. How to operate the Inverter from the keypad



7.1 Use the dial to set the required speed.

The display will change to show the current speed reference in Hz.

The minimum speed reference is defined by parameter b1.07 and the maximum reference by b1.06.



7.2 Press the green “Run” button to start the motor.

Press the green button firmly to start the motor. The motor will accelerate to the speed set in 7.1 (above) in the time defined by parameter b1.20.

Motor speed can be changed whilst the motor is running by rotating the dial clockwise (faster) or anti-clockwise (slower). When the motor is running, the “Run” lamp will be illuminated.



7.3 Press the red “Stop” button to stop the motor.

The red button will stop the motor.

The time taken (in seconds) to stop the motor is determined by parameter b1.21.

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

If the integrated dial on the keypad is unsuitable for the application, a remote Potentiometer can be used instead.

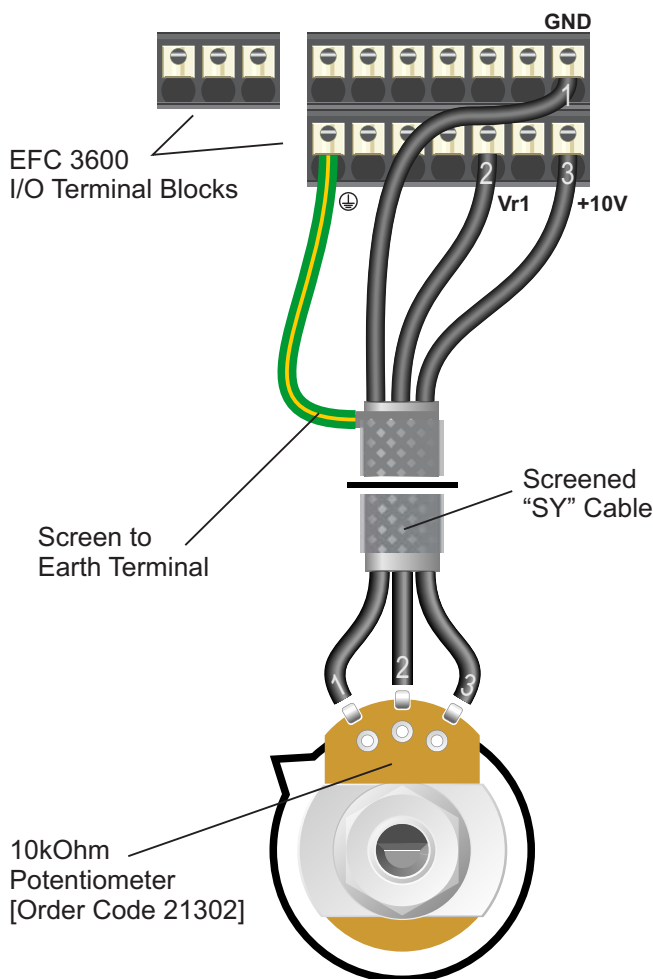
This provides the benefit of allowing motor speed to be controlled from a more convenient location such as a cabinet door (if the EFC 3600 is cabinet-mounted) or on the machine itself.

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.

8.1 Parameters to change for remote Potentiometer speed control

Parameter	Description	How to set
b0.02	Access to additional parameters	Default is 0 for Basic Parameters. Set at 2 to enable Extended Parameters.
b1.00	Frequency Setting Source	Set to 2 to enable 0-10V via 10kOhm Potentiometer
E0.22	Potentiometer Min Speed Hz	Set to 05.00 for most applications.
E0.24	Potentiometer Max Speed Hz	Set to 50.00 for most applications.



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 Vr1 terminal at the Inverter end. It is this voltage which provides the speed signal with 0V being slowest and 10V fastest.

The default output frequency at 0V is 0Hz. To change this, edit Parameter E0.22. The default output frequency at 10V is 50Hz. To change this, edit Parameter E0.24.

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 GND.

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

9. 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.

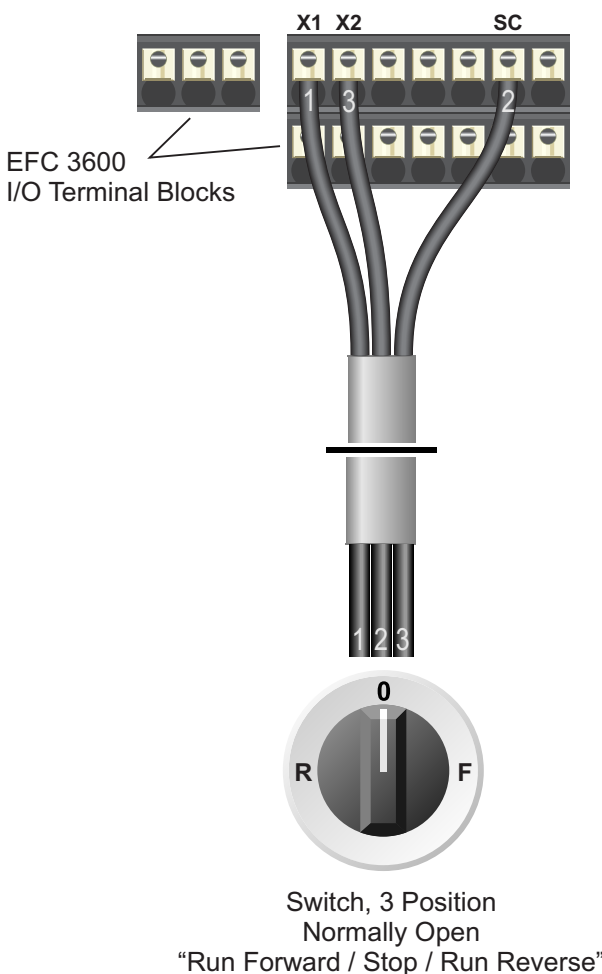
If this is unsuitable for the application, a remote switch can be used instead.

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

Note that once this procedure is complete, the Run/Stop buttons on the Inverter can no longer be used.

9.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
b0.02	Access to additional parameters	Default is 0 for Basic Parameters. Set at 2 to enable Extended Parameters.
b1.02	First RUN Command Source	Set to 1 for IO Terminals on the Inverter
E0.00	2-wire / 3-wire control	Set to 0 for 2-wire control with Run/Forward or Run/Reverse
E0.01	Terminal X1 program	Set to 23 for run forward command on X1
E0.02	Terminal X2 program	Set to 24 for run reverse command on X2



9.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite.

The SC terminal is a common connection for terminals X1-X5 and has no other function.

A suitable 3 position NO (Normally Open) switch should be installed between terminals SC, X1 and X2. The centre position should remain open circuit.

When a connection is made between terminals SC and X1, the motor will run forward. When terminals SC and X2 are connected, the motor will run in reverse.

Care should be taken to ensure that terminals X1 and X2 cannot be connected to SC at the same time or to each other.

10. 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.

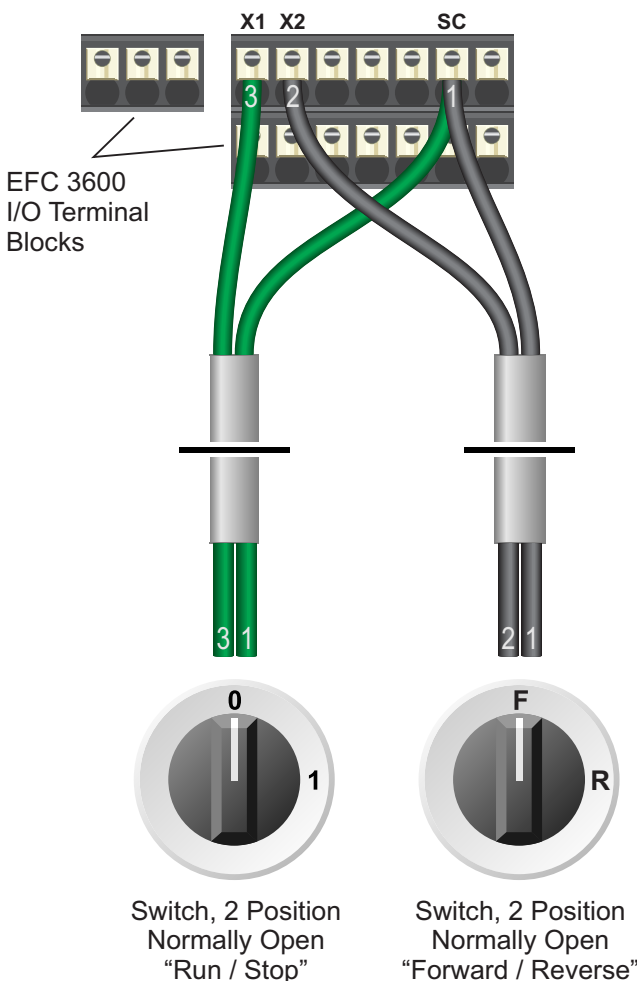
If this is unsuitable for the application, remote switches can be used instead.

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

Note that once this procedure is complete, the Run/Stop buttons on the Inverter can no longer be used.

10.1 Parameters to change for remote Run/Stop

Parameter	Description	How to set
b0.02	Access to additional parameters	Default is 0 for Basic Parameters. Set at 2 to enable Extended Parameters.
b1.02	First RUN Command Source	Set to 1 for IO Terminals on the Inverter
E0.00	2-wire / 3-wire control	Set to 1 for 2-wire control with Run/Stop and Forward/Reverse
E0.01	Terminal X1 program	Set to 23 for run forward command on X1
E0.02	Terminal X2 program	Set to 24 for run reverse command on X2



10.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite.

The SC terminal is a common connection for terminals X1-X5 and has no other function.

Two suitable 2 position NO (Normally Open) switches should be installed: One between terminals SC and X1 (Run/Stop) and the other between terminals SC and X2 (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.

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

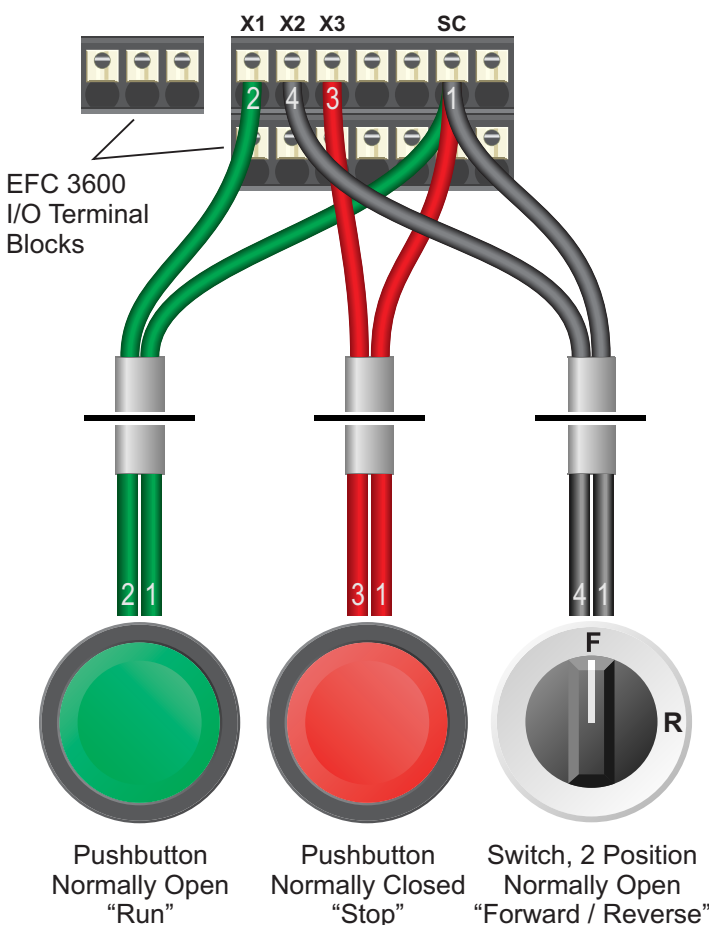
The parameters described in Section 5 enable Run/Stop operation via the red and green buttons on the Inverter.

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 commands via separate pushbuttons and Forward/Reverse selection via a selector switch. Note that once this procedure is complete, the Run/Stop buttons on the Inverter can no longer be used.

11.1 Parameters to change for remote 3-wire control

Parameter	Description	How to set
b0.02	Access to additional parameters	Default is 0 for Basic Parameters. Set at 2 to enable Extended Parameters.
b1.02	First RUN Command Source	Set to 1 for IO Terminals on the Inverter
E0.03	Terminal X3 program	Set to 7 for 3-wire running control on X3
E0.00	2-wire / 3-wire control	Set to 2 for 3-wire control with Forward/Reverse selection
E0.01	Terminal X1 program	Set to 23 for run forward command on X1
E0.02	Terminal X2 program	Set to 24 for run reverse command on X2



11.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. The SC terminal is a common connection for terminals X1-X5 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 SC and X1 and the “Stop” a Normally Closed contact between terminals SC and X3.

For “Forward/Reverse” a suitable 2 position NO (Normally Open) switch should be installed between terminals SC and X2.

A momentary connection between SC and X1 will start the motor. It will continue to run until the connection between SC and X3 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.

12. 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 “OE-3” error messages. In many cases, the solution is to increase the deceleration time to compensate.

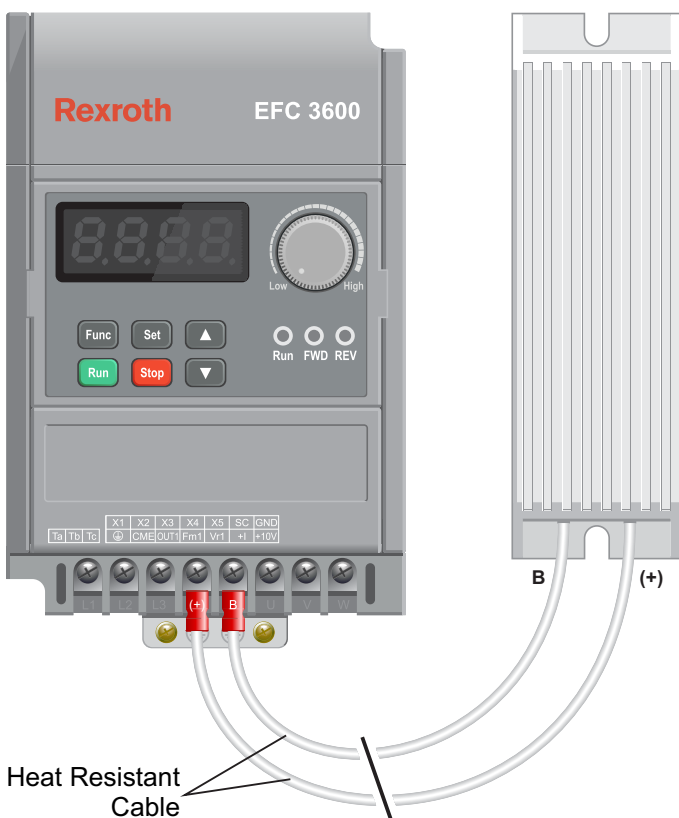
However, if the application requires it, dynamic braking can be enabled to maintain or reduce deceleration times by absorbing the energy generated by such loads.

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.

12.1 Parameters to change for Dynamic Braking

Parameter	Description	How to set
b0.02	Access to additional parameters	Default is 0 for Basic Parameters. Set at 2 to enable Extended Parameters.
E4.01	Overvoltage prevention setting	Set to 2 for Stall protection disabled, braking enabled.



12.2 Connecting the Resistor

A wiring diagram is shown in the illustration opposite. Connect the brake resistor to the B and (+) 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.

13. How to reset the Inverter to Factory Defaults



13.1 Select the b0 Parameter Group

With the motor stopped, press the “Func” button repeatedly until the display shows “-b0-” (do not press and hold the “Func” button).



13.2 Select Parameter b0.05.

Press the “Set” button to select the b0 Parameter group then use the up button to locate parameter b0.05.



13.3 Change value of b0.05 from 0 to 1.

Press the “Set” button to edit the value of b0.05 and use the up button to change this from 0 to 1.

Press the “Set” button again to save the changes.



13.4 Finished

The display will show the next parameter for editing (b0.06).

Press the “Function” button twice to exit from the parameter menu.

Optional: repeat the process and change b0.05 from 0 to 2 to clear recent fault messages if required.