



Installation and Troubleshooting Guide

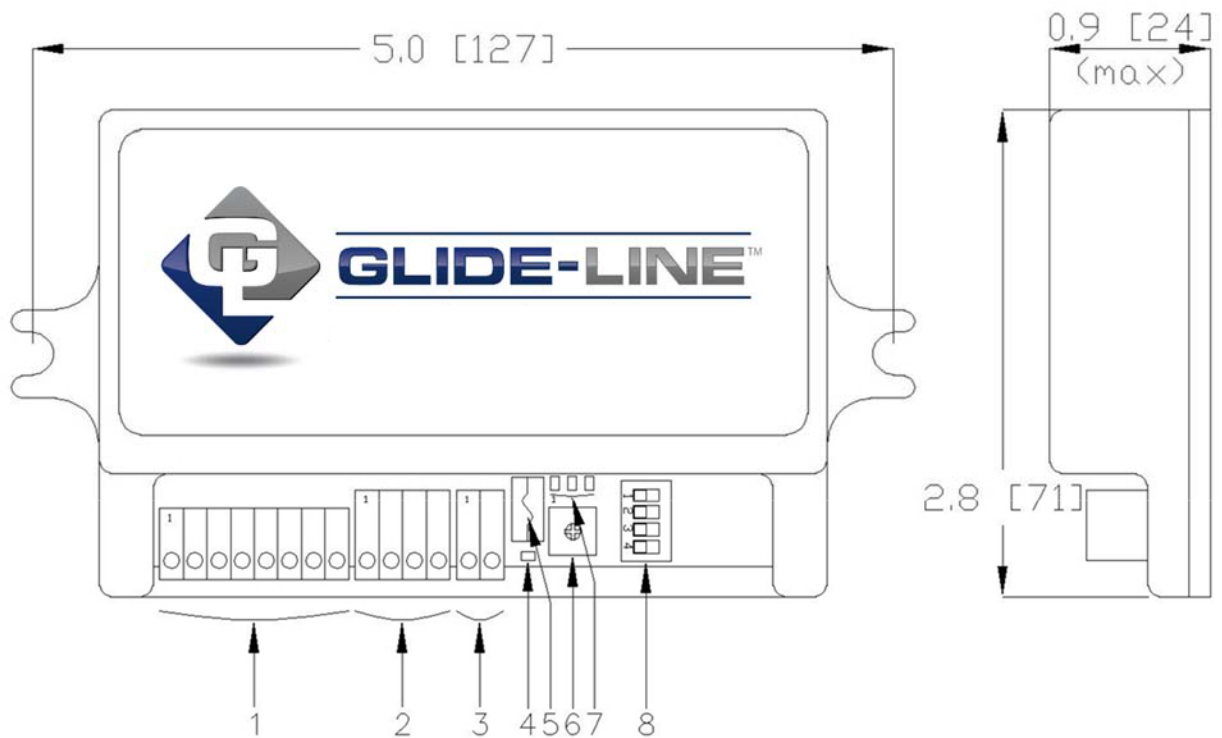
P-00020 Basic Motor Control Generation II (BMC-2)



CONTENTS

1	Product Diagram	3
2	General Notes	4
2.1	Motor Cable & Connection Header	4
2.2	Smart PNP Inputs/Outputs (I/O)	4
2.3	DC Power Input Header	4
2.4	Fuse LED Indicator.....	4
2.5	Replaceable 10A Fuse.....	4
2.6	Speed Control Potentiometer.....	5
2.7	Diagnostic Feedback LEDs	5
2.8	Configuration Switches.....	5
2.9	Mounting Plate/Heat Sink.....	5
2.10	Cover.....	5
3	Installation Guide	5
4	Diagnostics & Troubleshooting	6
4.1	Fuse Indicator LED	6
4.2	Feedback LEDs.....	6
4.2.1	Fault LED (Red).....	6
4.2.2	Motor LED (Amber).....	6
4.2.3	Power LED (Green).....	7
4.3	Firmware Version Display.....	7
4.4	Additional Assistance	7
5	Document Revision History	Error! Bookmark not defined.

1 Product Diagram



- | | |
|-----------------------------------|--------------------------------|
| 1. Motor cable & connection | 6. Speed Control Potentiometer |
| 2. Smart PNP Inputs/Outputs (I/O) | 7. Diagnostic Feedback LEDs |
| 3. DC Power Input Header | 8. Configuration Switches |
| 4. Fuse LED Indicator | 9. Mounting Plate/Heat Sink |
| 5. Replaceable 10A Fuse | 10. Cover |

NOTE: This guide refers to the components by their item number as listed above.

Figure 1: Controller Components (List of Items)

2 General Notes

2.1 Motor Cable & Connection Header

CAUTION: Use of extension cables may cause permanent damage and will void the product warranty.

Glide-Line™ motors and controls are designed to operate together as a complete and compatible drive system. Proper care must be taken to prevent damage to the control, motor and connection cable.

Motors come with a permanent, built-in power & control cable having either a 20 inch or a 72 inch cable length for connection solely to compatible Glide-Line™ controls. See the specific motor or gearbox specification sheet for details. Do not attempt to connect the motor cable to any other control.

Do not put tension on the motor cable connection. Tension, cable strain or stress on the motor cable could deform the pressure contacts inside the motor connector. This could result in intermittent motor connections and in extreme cases may bend the pins on the control board.

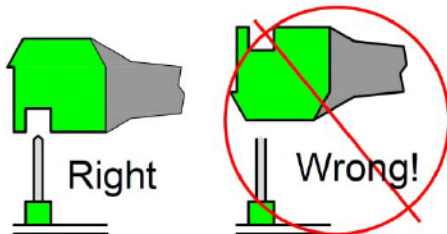
The motor connector is designed to be installed on the control and then remain connected to the control for the life of the motor. **Do not remove the motor connector except in the rare instance of motor or control replacement. The motor connector must not be used as a power on/off switch.**

If the motor connector must be removed from the control, remove the connector slowly by carefully lifting while also gently rocking the connector from side-to-side (“inch-worming”) in order to lift the connector off the control pins a little at a time. Lift the motor connector straight up by grasping the sides of the motor connector and avoid using the cable strain relief as a handle to lift the connector.

Power to the control and motor must be removed by turning off or removing input power at the source (Lock-out & Tag-out preferred). Alternately, by disconnecting the +24V DC Power Input Connection Header (see section 2.2 below) on the control. **The motor connector must not be used as a power on/off switch.**

Do not disassemble the motor cable. If the motor cable becomes damaged obtain a replacement motor.

NOTE: The motor connection cable must be oriented on



the control header pins as shown in the figure below.

Figure 2: Orientation of Motor Connector and Plug

2.2 Smart PNP Inputs/Outputs (I/O)

A 4-pin Phoenix PT1.5/4-PVH-3.5 plug is supplied. The smart inputs are used to tell the motor what mode to run in. See *Section 3: Installation Guide* for setup instructions. The smart outputs are used to indicate that a fault has been detected or to indicate that the motor is rotating.

NOTE: These are PNP only.

Table 1: Smart PNP Inputs and Outputs Pinout

Pin:	Name:	Description:
1	Smart Input 1*	See <i>Section 3: Installation Guide</i> for instructions.
2	Smart Input 2*	
3	Smart Output 2	Fault Detected Indicator
4	Smart Output 1	Motor Rotating Indicator

***NOTE:** Smart Input pins 1 and 2 are considered active above +18 Volts DC. Always leave the connector in place to avoid accidentally shorting the pins.

2.3 DC Power Input Header

CAUTION: This input is not fused. Connecting +DC to this position followed by shorting another pin to ground may cause catastrophic damage to the control. Power must be applied with proper polarity to avoid potentially damaging the controller. Follow the pinout shown in Table 2: DC Power Inputs Pinout.

A 2-pin Phoenix PT1.2/2-PVH-3.5 plug is supplied. The BMC-2 operates off a +22 to +28 volt DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

Table 2: DC Power Inputs Pinout

Pin:	Signal:
1	+22 to +28 Volts DC
2	DC Ground

NOTE: When adjacent zones are operating from separate power supplies, it is highly recommended that their DC grounds are connected. However, do not connect their positive voltage pins together.

2.4 Fuse LED Indicator

A single red light-emitting diode (LED) is used as a fuse indicator. See *4.1 Fuse Indicator LED* for further information.

2.5 Replaceable 10A Fuse

Replace only with Littelfuse part number 0451010.

2.6 Speed Control Potentiometer

The speed control potentiometer is used in combination with configuration switches 2, 3, and 4 to set the speed of the controller. A speed range is first set by the switches as described in *Section 2.8 Configuration Switches*. The potentiometer is then used to select a speed in that range.

When the potentiometer is fully clockwise the control will be at the max speed set by the configuration switches. When the potentiometer is fully counter-clockwise the control will be at the minimum speed set by the configuration switches. Turning the potentiometer to a spot in between these values will select a speed in between the minimum and maximum speeds set by the configuration switches proportionally.

Adjust fully clockwise to set the speed to approximately 350 RPM. When fully counter-clockwise, the speed is set to approximately 70 RPM. To set an intermediate speed between 70 and 350, turn the potentiometer to an appropriate setting in between.

2.7 Diagnostic Feedback LEDs

The control board contains the following three (3) LED diagnostic feedback indicators:

- One (1) Red
- One (1) Amber
- One (1) Green

To learn more, see *4.2 Feedback LEDs* and *4.3 Firmware Version Display*.

2.8 Configuration Switches

The control reads the configuration switches only when the unit is powering up. To change a setting, disconnect power, set the switch, and then reconnect power. The **OFF** position is to the **Left**. The **ON** position is to the **Right**. Switch descriptions are given in the following table.

Table 3: Configuration Switch Settings

Switch:	Description:	OFF Setting:	ON Setting:
1	Rotation Direction	Counter-Clockwise*	Clockwise*
2	Speed Select 1	See Section 3: Installation Guide for instructions.	
3	Speed Select 2		
4	Speed Select 3		

***NOTE:** Direction of rotation is from the motor looking out in the direction of the shaft.

2.9 Mounting Plate/Heat Sink

CAUTION: If mounting the control on a curved section of conveyor, use washers between the mounting plate and the conveyor frame. This is to ensure that the mounting plate is not distorted, causing damage to the enclosed printed circuit board assembly.

This component is for mounting the control assembly to the conveyor frame using two ¼ inch (0.25 in or 6.35 mm) bolts while keeping the controller cooler.

2.10 Cover

CAUTION: Removal of the cover will void the warranty. The cover does not make the controller waterproof or dustproof.

The cover can help reduce the severity of damage to the controller from foreign objects.

3 Installation Guide

This section describes setup and operation of the BMC-2 control and motor. For additional information refer to the application notes for this controller.

1. Mount the control in a location so that the motor cable reaches the connection header without putting strain on the cable connector or motor connection header.
2. Set the configuration switches (item 8) based on the required direction of forward rotation and the preferred speed range.
 - a. Set switch 1 to OFF for counter-clockwise rotation or set it to ON for clockwise rotation.
 - b. Set switches 2-4 for the speed range desired as described in *Table 4: Installation Speed Ranges*.
 - c. Use the speed control potentiometer (item 6) to set the desired motor speed within the range set in the previous step.

Table 4: Installation Speed Ranges

Switch:			Speed:	
4:	3:	2:	Min:	Max:
OFF	OFF	OFF	316	350
OFF	OFF	ON	281	315
OFF	ON	OFF	246	280
OFF	ON	ON	211	245
ON	OFF	OFF	176	210
ON	OFF	ON	141	175
ON	ON	OFF	106	140
ON	ON	ON	71	105

NOTE: The switches are read during power-up only. Set the switches, then connect power to the board.

3. Connect cables to the Smart I/O pins (item 2) that will be utilized. The input signals are required for operation. The output signals are optional and depend on the installation

setup. See the table below for information on mode selection using the smart inputs. See 2.2 Smart PNP Inputs/Outputs (I/O) for smart I/O pin assignments.

Table 5: Installation Smart Input

Smart Input 1:	Smart Input 2:	Mode:
OFF	OFF	Brake and Hold
ON	OFF	Run Forward
OFF	ON	Run Reverse
ON	ON	Coast (No Braking)

***NOTE: Smart input pins 1 and 2 are considered active above +18 Volts DC.**

4. Connect PNP inputs to operate the motor. In response to two inputs, the motor performs one of the following actions:
 - **Brake and Hold:** The default state with no inputs to either Smart Input 1 (leftmost position on the connector) or Smart Input 2 (second position).
 - **Run Forward:** An input to Smart Input 1 in the absence of an input to Smart Input 2 results in the motor operating in the direction set by Switch 1.
 - **Run Reverse:** An input to Smart Input 2 in the absence of an input to Smart Input 1 results in the motor operating in the direction opposite the direction set by Switch 1.
 - **Coast:** Simultaneous inputs to Smart Input 1 and Smart Input 2 result in the motor coasting with no braking action.
5. (Optional) Connect PNP outputs:
 - a. **Smart Output 2 (position 3):** A PNP output that is active whenever no faults have been detected. This signal is inactive in any of the following conditions:
 - A blown fuse.
 - A disconnected motor.
 - Power is not connected with the correct polarity.
 - b. **Smart Output 1 (position 4):** A PNP output that is active whenever the motor is running in either direction. This is intended for use in unidirectional systems to operate a second motor simultaneously with the motor connected to this control.
6. Plug the motor connector into the 8-pin header (item 1) on the board, oriented as shown in **Error! Reference source not found.** The notch in the bottom of the plug fits securely over the black bar on the pin header.
7. Connect the power leads to the 2-pin connector (item 3) using the supplied connector with the correct polarity.
8. After all zones in the system are prepared, turn on power.

4 Diagnostics & Troubleshooting

There are four (4) LEDs on the board shown in *Figure 1: Controller Components*. They correspond to items 4 and 7 (see 2.4 Fuse LED Indicator and 2.7 Diagnostic Feedback LEDs). These LEDs may be useful in diagnosing various wiring and connection problems.

If power is connected there will always be at least one LED illuminated or flashing. When no LED is illuminated, there is no power.

4.1 Fuse Indicator LED

CAUTION: This fuse will not blow under normal circumstances. Inspect all wiring connections to assure that there are no short circuits.

This red LED is item 4 in *Figure 1: Controller Components*. It illuminates constantly if the fuse (item 5) is blown and power is applied with the proper polarity.

Replace the fuse with Littelfuse 0451010 only.

4.2 Feedback LEDs

There are three (3) feedback LEDs located directly over the speed control potentiometer. They are shown in item 7 of *Figure 1: Controller Components*.

4.2.1 Fault LED (Red)

This is off under normal circumstances but will provide one of the following five signals if a problem is detected:

- **One (1) flash in 4 seconds:** The board has a hardware problem. Return it to your supplier.
- **Two (2) flashes in 4 seconds:** The input voltage is too high. Adjust the voltage.
- **Three (3) flashes in 4 seconds:** The input voltage is too low. Adjust the voltage.
- **Four (4) flashes in 4 seconds:** There is a problem with the motor cable or connection. Check to see that the cable is not damaged and that all of the wires are secure. If the cable has been cut or the wires are disconnected refer to *Section 2.1 Motor Cable & Connection* in the *General Notes*.
- **Constantly ON:** The motor is stalled or the sensor is continuously blocked. Check for mechanical obstructions.

4.2.2 Motor LED (Amber)

- **Four flashes in 4 seconds:** Components on the board have overheated and the circuit is limiting the power to the motor to about ½ of normal. This problem will correct itself when the board has cooled adequately. Check for mechanical obstructions.
- **Constantly ON:** Motor current is at the maximum allowed and is being electronically limited. Check for mechanical obstructions.

- **Flickering:** If the motor starts under significant load, the current may be limited briefly causing the LED to flicker. If the LED flickers constantly, this is an indication that the motor is operating at its upper limit and may never reach the full speed as set by the potentiometer. This is not a cause for concern and no corrective action is required.

4.2.3 Power LED (Green)

Constantly ON: Power is properly supplied as long as the fuse is not blown.

4.3 Firmware Version Display

The three feedback LEDs are used to communicate the firmware revision of the control assembly during the start-up sequence. Each time that power is applied to the board, the green and red LEDs will turn on immediately. After 1 second the amber LED will flash on for 0.75 seconds followed by an off period. An off period of 1.5 seconds represents a decimal point separating major revisions from minor revisions. An example is shown below.

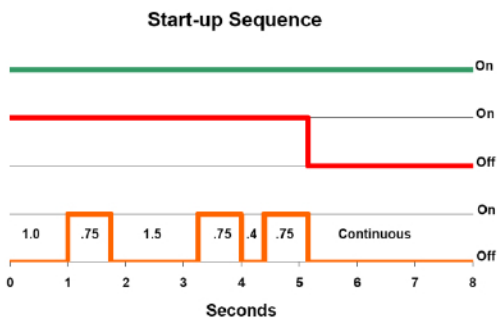


Figure 3: Firmware Version Display Example

The example sequence above represents firmware revision 1.2. When the red LED turns off, the start-up sequence has ended and normal operation begins.

4.4 Additional Assistance

To request the latest revisions to our Installation User manuals or for additional assistance, please contact Glide-Line™ at (215) 721-1900.