Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Dayton® DC Motor Control

Description

The 4Z527 Dayton adjustable speed DC motor control is designed for applications requiring constant (or diminishing) torque, such as conveyors, fans, blowers, pumps, mixers, etc.

It is designed to operate only one DC motor. The 4Z527 control is a general purpose, economical variable speed control for small DC and universal motor applications featuring: dual input voltages 120/240 VAC, power On/Off toggle switch, adjustable trimpot settings, quick connect terminal pins, and packaged in a small Nema 1 enclosure.

Control Features

- Dual voltage model 120/240 VAC input
- Output voltage 0-90/180 VDC
- Full wave bridge power supply
- Adjustable Minimum speed (0-30% of max)
- Adjustable Maximum speed (40-115% of base)
- Adjustable IR Compensation
- Fixed Acceleration (0.5 seconds)
- 25:1 speed range
- 1% speed regulation
- Shunt field supply provided (.75 Amp max) - 100V for 120 VAC; 200V for 240 VAC Input
- Overload capacity of 200% for 1 minute
- Transient voltage protection
- Power on/off switch

MODEL 4Z527

Figure 1

Dayton® DC Motor Control

Dimensions

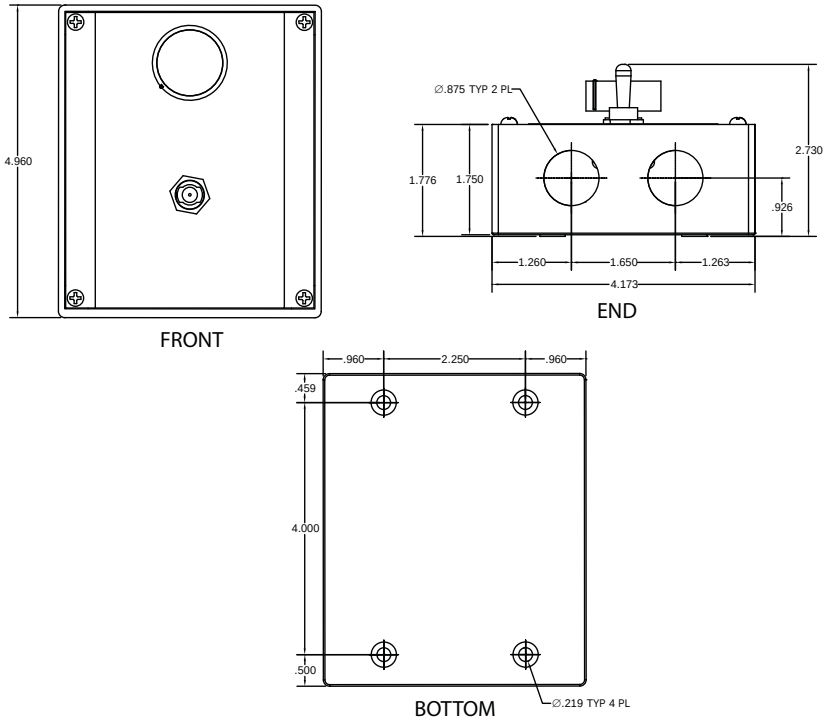

Figure 2

Specifications

AC Input Voltage	± 10% Rated Line Voltage
Input Voltage -	120 VAC or 240 VAC
Output	0-90Vdc (1/50 - 1/6 HP) or 0-180Vdc (1/25 - 1/3 HP)
Amps - Continuous DC Output	150mA to 2 Amps
Input Frequency	50 / 60 Hertz
I.R. Compensation	Adjustable - full range
Max. Speed	Adjustable (40 - 115% of Base Speed)
Min. Speed	Adjustable (0 - 30% of Max)
Output Voltage MAX - (120 or 240 VAC Input)	105/210 VDC
Overload Capacity	200% for 1 minute
Shunt Field Voltage	.75 Amp max, 100 VDC at 120 VAC
	.75 Amp max, 200 VDC at 240 VAC
Speed Control	5K Ohm Speed Potentiometer
Speed Range	25:1
Speed Regulation	± 1% of Base Speed
Temperature Range	-10° to 40° C. Ambient (15° to 105° F.)
Transient Protection	G-Mov
Dimensions	4.173" wide, 4.960" high, 2.730" deep
Weight	10.40 oz.

Model 4Z527H

Application Information

If replacing another motor with this control and a DC motor, make sure that the full load torque rating of the DC motor is equal to, or greater than, the full load torque rating of the motor being replaced. Take into consideration how much starting torque is required.

If high voltage surges (transients) are present on the AC supply lines for the control, protect the control by installing an isolation transformer or other line filtering.

⚠ WARNING

Do not operate the contol near high capacitive discharge equipment such as electrical welders.

This control does not have a current/ torque limit feature. A DC motor can develop a starting torque of up to 600% of it full load rating. A line fuse should be used to protect against continuous overload. For proper fuse sizing, see Fuse Selection Table.

⚠ CAUTION

Tampering with or any attempt to modify this control will void the warranty. Incorrect wiring and accidental grounds will seriously damage the control and/or motor and will void the warranty.

General Safety Information

⚠ WARNING

Disconnect power before installing or servicing.

1. Lock and tag the power disconnect to OFF to prevent unexpected application of power.
2. Follow all local electrical and safety codes as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
3. Motor and control must be securely and adequately grounded. This can be accomplished by wiring with a grounded, metal-clad raceway system, by using a separate ground wire connected to the bare metal of the motor and control frame, or other suitable means. Refer to NEC Article 250 (Grounding) for additional information.
4. Provide guarding for all moving parts.
5. Do not touch the frame of an operating motor or control. When fully loaded they may run at very hot temperatures. Modern-designed motors normally run hot at rated voltage and load.
6. Protect the power cable from sharp objects.
7. Do not kink the power cable, and never allow it to touch oil, grease, hot surfaces, or chemicals.
8. Make certain that the power source conforms to the requirements of your equipment.
9. Keep dirty cleaning rags and flammable waste materials in a tightly closed metal container or dispose of in the proper fashion.
10. If needed, clean the front of the control enclosure with a mild solution.

Installation

⚠ WARNING

Motor shaft keyway edges may be sharp and it is recommended that only qualified electricians or service people should install, troubleshoot, maintain, or sevice the control, motor, and interconnect wiring.

MOUNTING

⚠ WARNING

Do not install the control and motor where the atmosphere is (or may become) explosive.

Mount the control firmly to a flat, rigid metal surface using No. 10 hardware. (Refer to Figure 2). Avoid mounting surfaces which vibrate excessively, such as on punch presses or similar equipment. Make sure the air temperature will not be higher than 40°C (104°F) in the mounting location.

⚠ CAUTION

Do not mount the control in locations where liquids can spray or drip on it, or where there is moisture, oil, dirt, or other foreign materials (sawdust, metal particles, etc.) in the air. For such environments, the manufacturer suggests mounting the control within a sealed enclosure.

CONNECTION

⚠ WARNING

Disconnect power source before connecting control or motor.

1. Use only copper wire rated 70°C or better.
2. Size motor armature and AC line conductors according to all National, State, and Local codes.
3. Minimum recommended wire size is No. 16 AWG for control input lines, and for interconnection lines between control and motor.

Dayton® DC Motor Control

Connection

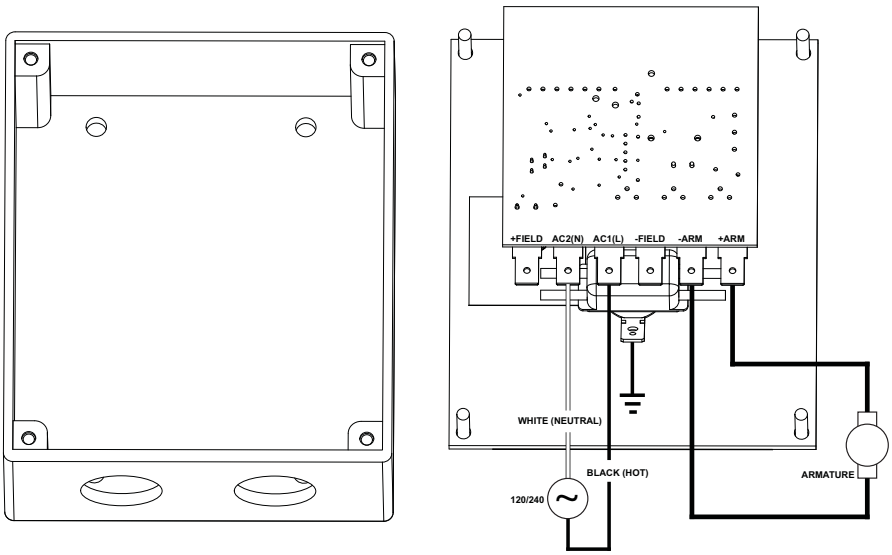

Figure 3 - Control Terminal Connectors

Make connections to the control and the motor in accordance with the Connection Chart. The control terminal 1/4" spades (Figure 3) are located inside the control enclosure on the PC board. To ground the control mounting plate, connect ground wire to the ground terminal located on the on/off switch

⚠ WARNING

Do not connect control AC power inputs to DC lines.

⚠ CAUTION

Never lay control cover plate with component side down on any conductive surface.

FUSE SELECTION

The control is shipped without fusing or breaker protection. An inline fuse should always be added to hot AC on 120VAC or both lines on 240VAC. Select and install fuses sized per the Control Fuse Selection Table below.

⚠ CAUTION

Incorrect fusing current or voltage rating will cause either inadequate protection or nuisance fuse blowing.

CONTROL FUSE SELECTION TABLE

MOTOR RATING	LINE FUSE
1/6 HP	4 Amp
1/8 HP	3 Amp
1/35 – 1/10	2 Amp
1/50 – 1/40	1 Amp

BASIC CONTROL SETUP

1. Safety Precautions:
   a. Observe the normal safety precautions for the voltages involved. It is strongly suggested that only qualified electricians or service people should install, troubleshoot, maintain, or service the control, motor, and interconnect wiring.
   b. Be sure power is disconnected or shut OFF at fuse box or circuit breaker when installing the control and making adjustments (except running adjustments).
   c. Remove the load from motor (or gearmotor) before running it.
   d. Use an insulated screwdriver to make trimpot adjustments.

⚠ CAUTION

When making running adjustments, be very careful not to touch any components except the adjusting pots.

2. On the control front panel, turn the control ON-OFF switch to off and set the control pot knob fully counterclockwise (CCW) and check line fuse.

NOTE: The fuse should be as specified by the Control Fuse Selection Table.

3. Check all the connections at the control terminals and at the motor. Make sure that they are tight and are made according to Figure 3 and the Connection Chart.
4. Rotate the motor's shaft manually to make sure it turns freely. A slight resistance may be noticed.

Model 4Z527H

5. Turn the control ON-OFF switch to the ON position and then slowly turn the Speed Control knob clockwise (CW) while observing direction of motor rotation. If opposite direction of rotation is desired, correct by turning OFF the control and then reverse the motor armature connections. Reverse the connection either at the control or at the motor, wherever is most convenient.
6. With AC line power and control back ON; slowly turn Speed Control knob fully CW while observing the motor. Motor should accelerate smoothly to top speed.
7. Turn OFF control and AC power to control.
8. Reconnect the motor load that the motor will normally drive.
9. Turn AC power and the control back ON, then test the control and motor under actual operating and load conditions; run the motor through the entire range of speeds required while it is fully loaded. Check motor speed with a tachometer.

If control/motor performance is not satisfactory, continue adjusting the control by following the procedures given in the next section, "Special Control Setup".

SPECIAL CONTROL SETUP

Use applicable sections of the following procedures if the "Basic Control Setup" procedures do not provide satisfactory motor/control performance.

1. Follow the Safety Precautions given in paragraph 1 of "Basic Control Setup Procedure".

Max Setting

2. If a different maximum speed or voltage is desired, adjust the MAX trim pot (on circuit board) as follows:
   a. Turn ON AC power to the control
   b. Set Speed Control knob fully (100%) CW
   c. Check motor speed and voltage with a tachometer and a DC Voltmeter.
   d. Using an insulated handle 1/8" blade screwdriver, adjust the MAX trim pot on the control PC board. (See Figure 4 for location.) Clockwise adjustment of the pot increases the maximum output to the motor; counterclockwise adjustment decreases the maximum output to the motor.

NOTE: Do not increase maximum motor speed above 1800 RPM for motors rated at 1725 RPM. Do not operate motor continuously above the rated DC voltage.

Min Setting

3. If a minimum speed is desired, adjust as follows:
   a. Turn ON AC power to the control.
   b. Turn Speed Control knob CCW as far as possible.
   c. Check motor output speed or voltage
   d. Adjust the MIN trim pot on the control PC board. (See Figure 4 for location.) Clockwise adjustment of the pot increases output to the motor; counterclockwise adjustment decreases.

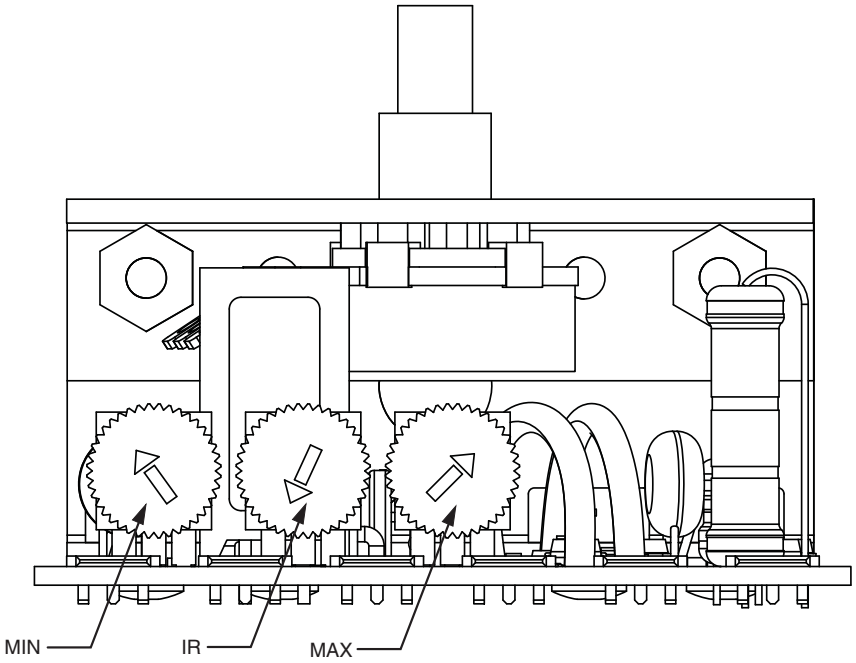

Figure 4 - Control Trimpot Adjustment Location

Dayton® DC Motor Control

SPECIAL CONTROL SETUP (CONTINUED)

NOTE: Typically the MIN pot should be set at Deadband which is the point in the CW rotation just before getting an output.

IR Setting

4. If better speed regulation is needed, then adjust the IR pot as follows:
   a. Set speed at 50%
   b. Check speed with Tach at no load
   c. Apply normal load to the motor
   d. Adjust the IR pot CW to increase speed regulation or CCW to decrease speed regulation until loaded motor speed is equal to unloaded motor speed.

NOTE 1: Adjustments made to any of the MIN, IR, and MAX trimpots may affect the settings of the other trimpots. It may be necessary to repeat the setup of each trimpot several times to achieve optimal tuning.

NOTE 2: Motor speed variations amounting to +/-5% of motor base speed, or less, are normal during operation at any set speed; you may not be able to eliminate them. (Base speed is the speed at which the motor, or motor portion of a gearmotor, runs when driven at rated armature voltage with rated load.)

OPERATION

PRECAUTIONS

⚠ CAUTION

This control is intended to drive motors used in constant (or diminishing) torque applications, such as on conveyors, fans, blowers, pumps, mixers, etc.

⚠ WARNING

Do not operate the control near high capacitive discharge electrical circuits, such as electrical welding machines.

⚠ WARNING

Regardless of motor speed, do not allow the torque load on the motor to exceed the motor nameplate full-load torque rating, for extended periods of time.

OPERATING PROBLEMS

Most motor problems are caused by one of the following conditions:

1. Loose connections at control or motor.
2. Overloading motor.
3. Low voltage at motor input terminals caused by one of the following conditions:
   a. Control AC input lines are undersized (conductors too small), or are too long for conductor size used.
   b. Control DC output lines to motor are undersized or too long

Always check connections, load, and supply circuits if motor fails to perform satisfactorily. Although the control is designed to operate on the AC voltage/frequency specified on its nameplate, it will also operate safely under normal motor loading conditions, on AC voltages/frequencies up to 10% higher or lower than that specified. For heavy motor loads, however, do not operate the control on AC voltages lower than the specified nameplate voltage. Some common causes of low voltage not previously mentioned are:

1. AC supply circuits overloaded by lights, eletrical appliances, or other motors.
2. Low incoming line voltage caused by distribution system overloads.
3. Undersized AC lines in building where control is being used.

Some effects of low voltage are:

1. Motor power loss.
2. Slow motor starting.
3. Slow motor running (won't reach top speed).
4. Motor overheating
5. Frequent fuse blowing and/or circuit breaker tripping

NOTE: Effects 2 through 5 can also be caused by motor overloads.

MAINTENANCE

⚠ WARNING

Make certain that the power supply for the control is disconnected before attempting to service or remove any components. Lock the AC power disconnect in the open position and tag it to prevent unexpected application of power. Only a qualified electrician or service person should perform any electrical troubleshooting or maintenance.

⚠ CAUTION

Incorrect wiring and accidental ground will seriously damage the control and/or motor, and will void the warranty.

CONTROL

The control chassis should be periodically inspected to prevent an accumulation of materials which might block the flow of cooling air.

Notes

Dayton® DC Motor Control

LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY. DAYTON' MODELS COVERED IN THIS MANUAL, ARE WARRANTED BY DAYTON ELECTRIC MFG. CO. (DAYTON) TO THE ORIGINAL USER AGAINST DEFECTS IN WORKMANSHIP OR MATERIALS UNDER NORMAL USE FOR ONE YEAR AFTER DATE OF PURCHASE. ANY PART WHICH IS DETERMINED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP AND RETURNED TO AN AUTHORIZED SERVICE LOCATION, AS DAYTON DESIGNATES, SHIPPING COSTS PREPAID, WILL BE, AS THE EXCLUSIVE REMEDY, REPAIRED OR REPLACED AT DAYTON'S OPTION. FOR LIMITED WARRANTY CLAIM PROCEDURES, SEE "PROMPT DISPOSITION" BELOW. THIS LIMITED WARRANTY GIVES PURCHASERS SPECIFIC LEGAL RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION.

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