Bardac drives

ODP-ENCOD-US ODP Encoder Feedback Installation and Operation Manual

⚠ Warning!

It is essential that you read and understand this entire manual and the entire contents of the Optidrive Plus 3GV User Guide that was supplied with your drive before proceeding with your installation and product configuration. For more information and to download product manuals and software, go to ***www.bardac.com***.

⚠ Warning!

Your use of motor controllers with encoder feedback may cause motors and machinery to power up with high voltages or start or operate in an unexpected, dangerous or lethal way. It is essential that you are completely familiar with all of the equipment and the system design you are working with before attempting to program or connect a device.

⚠ Warning!

You are entirely responsible for the configuration or use of any Bardac product. By configuring or using these products you agree to indemnify and hold harmless Bardac Corporation, its' employees, directors, officers, distributors and resellers against the consequences of your configuration or use of the products.

ODP Encoder Feedback Introduction

ODP Encoder Feedback Module plugs into the communications port of the Optidrive ODP series to provide improved accuracy and low-speed performance. A dedicated cable is provided.
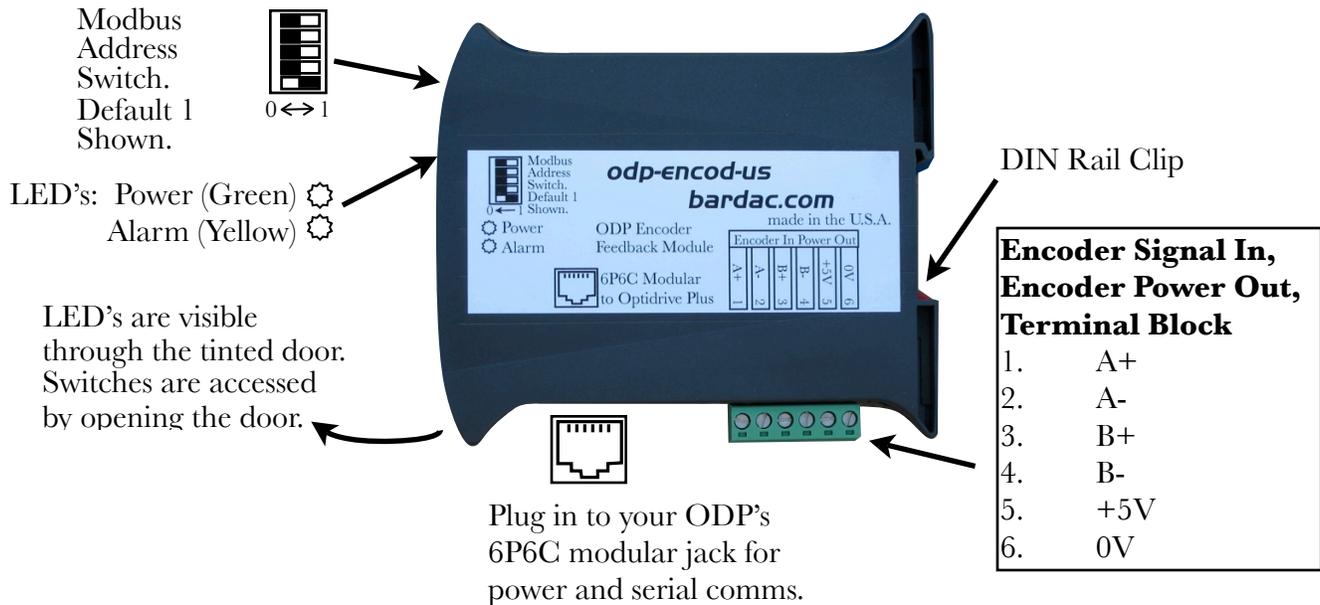
Encoder Feedback Features

- EIA422/485 standard encoder receivers. Up to 300kHz max.
- Uses ODP's Modbus comms allowing use with Optibus systems.
- Encoder and Modbus serial comms fault detection and indicator.
- 5V, 100mA max. power out provided to supply the encoder.

Available Option

-RTX Retransmit Option. Encoder pulses are reproduced and transmitted with EIA485 standard. Used in more complex systems to provide simultaneous encoder information to other receivers.

ODP Encoder Feedback Module Layout

Modbus Address Switch. Default 1 Shown.

$0 \longleftrightarrow 1$

LED's: Power (Green)
        Alarm (Yellow)

LED's are visible through the tinted door. Switches are accessed by opening the door.

DIN Rail Clip

odp-encod-us
bardac.com
made in the U.S.A.

Modbus Address Switch. Default 1 Shown.

Power
Alarm

ODP Encoder Feedback Module

6P6C Modular to Optidrive Plus

Encoder In Power Out

A+ 1 A- 2 B+ 3 B- 4 +5V 5 0V 6

Encoder Signal In, Encoder Power Out, Terminal Block
1.   A+
2.   A-
3.   B+
4.   B-
5.   +5V
6.   0V

Plug in to your ODP's 6P6C modular jack for power and serial comms.

Physical Installation

Requires less than one inch of DIN rail space in an electrical enclosure that provides the required environmental protection. Install next to the Optidrive's 6P6C modular plug.

Dimensions and Weight: 0.9"w, 4.0"h, 4.7"d (23, 102, 120mm) 0.5 lb (0.22 Kg)

Power Requirements: Regulated 24VDC ±15%, 40mA plus loads supplied from ODP via 6P6C Modular connection.

Storage and Operation Environment: Clean air. Temperature range; 0 to 50C. Humidity less than 95% non-condensing.

Status Indicators and Modbus Address Selector switch Available through front door. Green, Power and yellow, Fault LED's

Electrical Installation

ODP Connection: Simply plug the module into your Optidrive Plus using the provided cable. If you require a longer cable please specify the length.

Encoder Wiring: Follow encoder manufacturer's recommendations. Motors and drives can produce high levels of electrical noise interference. Ideally, encoder signal wire should be individually shielded twisted pairs with shielded sheathing overall, such as Belden 8163. The power supply lines should use a twisted pair. The shield should be grounded at ONLY ONE END, usually at the drive.

Modular Cables Available	
Part No.	Length(m)
OD-48503	0.3
OD-48510	1.0
OD-48530	3.0

Configure Your Optidrive Plus.

Ensure your drive is in the Stop condition. Set parameters **P1-07** Motor Voltage and **P1-08**, Motor Rated Current according to your motor's nameplate information.

WARNING! This configuration procedure requires access to the ODP Extended Menu Sets. Do **NOT** change any parameter in the Extended Menus unless directed to do so herein. Be sure to return parameter **P1-14,** Extended Menu Access Code, to default 0 once you are satisfied with your installation. Extended menu items can seriously affect proper and safe operation of the drive.

1. **P1-14**, Extended Menu Access Code. Set to 702 for extended access.

2. Check monitoring parameter **0-28**, Software ID, indicates 3.00 or higher. Earlier versions will NOT work with the encoder feedback module. Guidelines for drive firmware upgrades may be found in application note, AN-ODP-28.

The following parameters are essential for accurate encoder feedback control:

3. **P1-09**, Motor Rated Frequency must match motor nameplate.

4. **P1-10**, Motor Rated Speed must match motor nameplate.

5. **P2-26**, Modbus RTU Baud Rate, must equal 115.2k

6. **P2-27**, Drive Communication Address, 1 to 31 generally may be left at default, 1. This number must be reflected by the binary coded positions of the 5 DIP switches behind the encoder feedback module front door.

7. **P4-01**, Control Mode must be set to 0, Vector Speed Control.

8. **P6-06**, Encoder PPR should equal the number of pulses per revolution produced by your encoder. If zero, encoder feedback is disabled.

9. **P6-07**, Encoder Speed error limit, 0 to 50% generally may be left at default 5%. Applications requiring tighter control may require the drive to trip at smaller errors while very difficult to control applications may require a larger window to avoid tripping.

0 ↔ 1
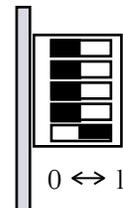
Modbus Address Selector switch represents a binary number. Default 1 is shown. All switches to the right, in the 1 position would represent address 31.

Autotune, and Verify Motor Rotation:

WARNING! You are now preparing to enable the drive, produce high Voltages at the motor terminals and rotate the motor.
Ensure the machine and motor wiring are prepared to be energized.
Ensure the machine is prepared for motor rotation.
Ensure that all applicable safety procedures are being followed and that all personnel are clear of the equipment.

10. Set **P1-12** to 1 to allow forward-only, keypad operation of the drive. If reverse rotation can cause damage and motor rotation has not yet been verified, you must disconnect the motor shaft from the machinery.

11. Set **P4-02** to 1 to enable the Autotune function.

12. Autotune is a static procedure and the motor will NOT turn. Press the navigate button, "-," to start the autotune process. You will hear a buzzing noise from the motor. Press and hold navigate for one second to exit the

menu and verify the display changes to, "Auto-t," for a few seconds and then returns to, "STOP." This indicates a successful Autotune.

13. Press the red Stop button to show the speed setpoint. Use the arrow keys to select a low speed setpoint that will allow you to verify spindle rotation direction.

14. You must connect Terminal 1 to Terminal 2 to allow drive to enable.

15. Press the green Start button and verify that the motor is rotating in the Forward direction. If it is not, you must disconnect and isolate power from the drive. **Wait for 10 minutes after the display goes blank**, disconnect and reverse two of the three motor supply leads. Re-power the drive and verify motor rotation.

16. While the motor is turning in the forward direction, navigate to monitor parameter **0-57, Encoder Feedback Speed**.

 IMPORTANT!; you must verify that the number shown in **0-57** is a positive number. There should **NOT** be a negative, "-," sign in front of the number. If you do not verify this, the motor can accelerate, out of control after the next step!

17. If the number in parameter **P0-57** is negative, press the Stop button then reverse the connection of the encoder leads A+ and A-. Connect A- at terminal 1 and A+ at terminal 2 on the ODP Encoder Feedback Module. Start the drive again and verify that the number in **P0-57** is now positive.

18. The encoder provides very precise speed feedback so parameter **P4-03**, Speed Controller Proportional Gain must be reduced from default 1000. Enter 300. This parameter may be changed again below.

19. You can now enable encoder feedback speed control. Stop the drive and set **P6-05** to 1. Start the drive again to verify that the motor accelerates smoothly and under control at various speed setpoints.

ODP Final Commissioning

20. Final commissioning should be done with your machine in ready-to-run condition. Motor shaft should be connected, control wiring should be complete, and if possible, the machine should be loaded with product as in normal use.

21. A common problem experienced while commissioning is a drive trip with, "**Enc-01**," displayed. This is a Speed error between reference and feedback over limit and indicates that the drive is not able to maintain accurate speed within the 5% limit set in **P6-07**. Of course the easiest fix would be to increase the value set in **P6-07**, however this may not be a satisfactory solution.

22. To improve the drives ability to match speed with the setpoint you may try longer ramp times at parameters **P1-03** and **P1-04**. This is especially true if you experience a, "**Enc-01**," trip while accelerating or deccelerating or while changing speed setpoint.

23. If you require faster ramp times or if you experience a, "**Enc-01**," trip while running with a steady setpoint, you can adjust high performance

motor control parameters **P4-03** and **P4-04**. These parameters are more difficult to, "tune in," and if poorly adjusted can greatly diminish the drive performance. Notice that it may be possible to improve performance over smaller speed ranges so it is important to tune under as normal running conditions as possible. See your ODP User Guide for more information. Note; when encoder feedback is enabled, **P4-03**'s effect is divided by 3 and **P4-04**'s is multiplied by 3.

24. Always remember to **set parameter P1-14 back to zero** after commissioning to ensure that no accidental changes can be made to the extended parameter set.

-rtx Retransmit Option

Modules with this option have an additional five position terminal block that produces two EIA485/EIA422 compatible pulse streams nearly simultaneously with the original A and B pulse streams received from your encoder.

Be sure to connect the 0V terminal to a 0V or signal ground terminal on your receiver for proper operation. Do NOT connect the 0V terminal to a chassis ground or unisolated ground without a 100 Ohm current limiting resistor in series.

List of Essential Parameters for Encoder Feedback Commissioning

Parameter No.	Parameter Name	Page Ref. in this Guide
P0-28	Software ID	3
P0-57	Encoder Feedback Speed	4
P0-59	Encoder Error Status	6
P1-09	Motor Rated Frequency	3
P1-10	Motor Rated Speed	3
P1-12	Terminal/Keypad Control	3
P1-14	Extended Menu Access Code	3,5
P2-26	Modbus RTU Baud Rate	3
P2-27	Drive Communication Address	3
P6-05	Encoder Feedback Enable	4
P6-06	Encoder PPR Value	3
P6-07	Encoder Speed Error Limit	3,4

Important Parameters Referred to Herein

Parameter No.	Parameter Name	Page Ref. in this Guide
P1-03	Accel. Ramp Time	4
P1-04	Decel. Ramp Time	4
P4-01	Control Mode	3
P4-02	Autotune Enable	3
P4-03	Speed Control P-Gain	4
P4-04	Speed Control Integral Time	4

Encoder Feedback Fault Conditions

All encoder fault conditions are indicated by the yellow Fault LED on the encoder feedback module and annunciated on the ODP display screen. Error codes 03 to 09 can also be seen in monitor parameter **P0-59**. Transient faults will be indicated by the yellow Fault LED for a minimum of 50 mS.

Error Code Annunciation on ODP Display Screen	Description
Enc-01	Speed Error Over Limit- Mismatch between feedback and setpoint
Enc-02	Reserved
Enc-03	P6-06 Encoder PPR Value, Range Error - Less than 60
Important:	If P6-06 is left at zero, encoder feedback is disabled.
Enc-04	P1-10 Motor Rated Speed, Range Error - Less than 1
Enc-05	Internal Calculation Overflow
Enc-06	Encoder Channel A Fault
Enc-07	Encoder Channel B Fault
Enc-08	Encoder Channels A and B Fault
Enc-09	P1-09 Motor Rated Frequency, Range Error - Less than 25

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