



Document Reference: AN060017VS1

VS1 Pulse Follower Mode

Required Equipment:

- EXBHH007A01 Pulse Follower Board
- VS1GV Vector Control
- VS1SP Inverter Control
- VS1SD Servo Control
- Miscellaneous Wiring
- Software 1.05 and later

Introduction:

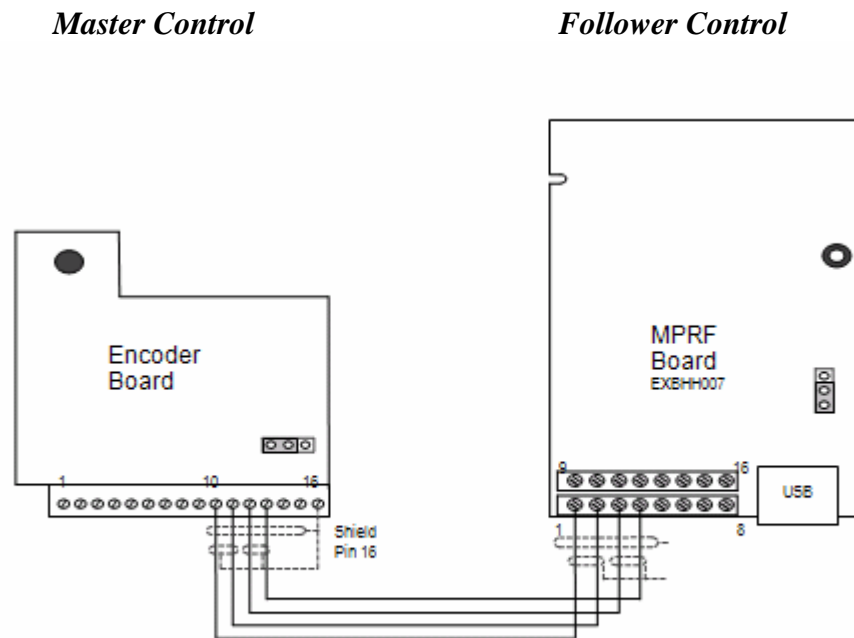
Typical Applications:

- Bridge Cranes
- Wire Draw
- Line Shaft
- Conveyers
- Web Lines
- Printing Presses

The Pulse Follower Mode is designed to be used in applications to ratio speeds between drives for pulse to pulse following as either a master or a follower drive in a process. A unique requirement is the ability to always stay in a position lock with the master control regardless if the master is accelerating or decelerating. The application requirement is precise position following of the master using a pulse train received from the master control. This application note will give you a basic setup of this operating mode using a master control and one follower control.

Procedure:

The wiring diagram below shows how to wire a Master (VS1) Vector Control encoder outputs to a MPRF Board inputs of a Follower (VS1) Control.



Note: Always tie your shields at your master control. Leave the follower control or the last control shields all tied together but not terminated.

The following represents parameter settings to be used. These settings assume the control has been programmed and runs properly from the keypad. When the EXBHH007 board is installed, two additional parameters will be available. They are:

Pulse Follower (Level I; Input Block; Operating Mode)
EXB Pulse Follower (Level I; Input Block; Command Source)

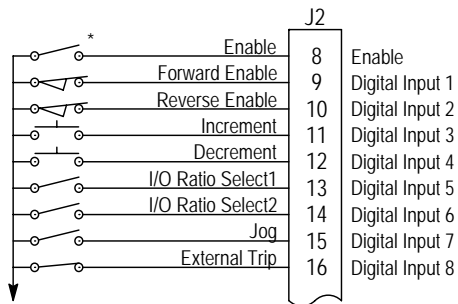
1. Install EXBHH007 expansion board (Note: Refer to page 3-1 of the MN755 Manual for Board Installation)
2. Set the Operating Mode of the Follower Drive to **Pulse Follower**(See Figure 1 for Pulse Follower Mode Connection Diagram)
3. Set the Command Source to **EXB Pulse Follower**

Pulse Follower Mode Parameters (Continued)

Parameter	P#	Adjustable Range	Factory	User Setting
OPERATING MODE	1401	0-KEYPAD 1-STANDARD RUN 2Wire 2-STANDARD RUN 3Wire 3-15 PRESET SPEEDS 4-FAN&PUMP 2WIRE 5-FAN&PUMP 3WIRE 6-PROCESS CONTROL 7-3SPD ANA 2WIRE 8-3SPD ANA 3WIRE 9-E-POT 2WIRE 10-E-POT 3WIRE 11-NETWORK 12-PROFILE RUN 13-15 PRESET POSITIONS 14-BIPOLAR 15-PULSE FOLLOWER	0	
COMMAND SOURCE	1402	0-NONE 1-ANALOG INPUT1 2-ANALOG INPUT2 3-KEYPAD 4-NETWORK 5-EXB PULSE FOLLOWER	1	

Figure 1

*Note: Remove factory jumper from J2-8 and J3-24 before connecting switch at J2-8.



See control manual for connection information and recommended tightening torques.

Pulse Follower Mode Continued

- J2-8 CLOSED allows normal control operation.
 OPEN disables the control and the motor coasts to a stop.
- J2-9 CLOSED to enable operation in the Forward direction.
 OPEN TO DISABLE Forward operation (drive will decel to a stop if a Forward command is still present).
 Reverse operation is still possible if J2-10 is closed.
- J2-10 CLOSED to enable operation in the Reverse direction.
 OPEN to disable Reverse operation (drive will decel to a stop if a Reverse command is still present).
 Forward operation is still possible if J2-9 is closed.
- Note: If J2-9 and J2-10 are both opened, the drive will decel to a stop.

- J2-11 Momentary closed.
If Track Mode parameter #3104=**Velocity or Position**, this increments the output portion of the ratio selected by J2-13 and J2-14, 5 times per second. The input portion of the ratio is fixed. If Track Mode parameter #3104=**Position Sync**, this increments the absolute position value by the value set in the Increment Step parameter #3105.
- J2-12 Momentary closed.
If Track Mode parameter #3104=**Velocity or Position**, this decrements the output portion of the ratio selected by J2-13 and J2-14, 5 times per second. The input portion of the ratio is fixed. If Track Mode parameter #3104=**Position Sync**, this decrements the absolute position value by the value set in the Increment Step parameter #3105.
- J2-13 Used with J2-14 switch to select Rx Ratio. Refer to Table 3–1.
- J2-14 Used with J2-13 switch to select Rx Ratio. Refer to Table 3–1.
- J2-15 CLOSED places control in JOG mode. When JOG is closed, the absolute position counter is reset to zero. Closing JOG while J2-9 and J2-10 are both open will reset the fault condition.

4. Set the **Accel/Decel** rates as desired on the Master Control. Note that the Accel and Decel rates of the follower, or followers, must be set to zero.
5. After installation decide which of three tracking modes you want to use: **Velocity Following, Position Following or Position Sync**. Switch operation and Software parameters are dependant on the mode you select.

Velocity Following Operation

- Follows the “Speed” of the master (not position).
- J2-11 Increments Rx Ratio OUT (ratio selected by J2-13 & 14).
- J2-12 Decrements Rx Ratio OUT (ratio selected by J2-13 & 14).
- J2-13 and J2-14 select up to 4 Ratios (See Table 1)

Position Following Operation

- Follows the “Position” of the master (not Speed).
- J2-11 Increments the selected Rx Ratio OUT (ratio selected by J2-13 & 14).
- J2-12 Decrements the selected Rx Ratio OUT (ratio selected by J2-13 & 14).
- J2-13 and J2-14 select one of 4 Ratios (See Table 1)

(Position following is not possible with an H2 Inverter or Open Vector controls) **NO FEEDBACK DEVICE**

Position Sync Following Operation

- Follows the “Position” of the master.
- J2-11 Increment the counts of the “Master Encoder” output.
- J2-12 Decrement the counts of the “Master Encoder” output.
- J2-13 and J2-14 select up to 4 Ratios (See Table 1)

(Position following is not possible with an H2 Inverter or Open Vector controls) **NO FEEDBACK DEVICE**

Table 1

J2-13	J2-14	Rx Ratio OUT #
Open	Open	1
Closed	Open	2
Open	Closed	3
Closed	Closed	4

Note: There are two input types available with the MPR/F Board; Quadrature and Speed. The master pulse train can be 5-15 volts signal level and will be retransmitted by the MPR/F board as 5VDC signal level.

6. Set the **Ratio** you want the control to follow the master control. A good rule of thumb is to start with a 1:1 ratio and then set the ratio to fit your application.

Pulse Follower Mode Parameters Continued
Parameter Block Values Level 3, Pulse Follower Block

Parameter	P#	Adjustable Range	Factory	User Setting
Master PPR	3101	50–20000 counts	1024	
Input Volts	3102	0-5V, 1-12V	0	
Input Type	3103	0-None, 1-Quadrature, 2-Speed,	1	
?Track Mode	3104	0-Velocity, 1-Position, 2-Position Sync	0	
Increment Step	3105	1-1024	1	
Rx Ratio Input	3106	1-1048576	1	
Rx Ratio OUT1	3107	1-1048576	1	
Rx Ratio OUT2	3108	1-1048576	1	
Rx Ratio OUT3	3109	1-1048576	1	
Rx Ratio OUT4	3110	1-1048576	1	
Output Type	3111	0-Quadrature, 1-Speed	0	
Tx Ratio	3112	1-1048576 : 1-1048576	1:1	

? Only available or active in Closed Loop Vector Mode.

Output Ratio example:

It is important to choose the best values for the ratios. For example 1:1 and 1000:1000 are both examples of a 1:1 ratio. However, the way that the Increment Step parameter increases the ratio can cause instability if the wrong value is selected.

Consider the following (Velocity or Position Following):

(Input:Output=1 and Increment Step = 1).

Starting Ratio	Increment Step	New Ratio
1:1	1	1:2
1000:1000	1	1000:1001

Notice that the output ratio for the 1:1 example has doubled with the first increment.

