VibroBlock® Feeder Systems Accessories

PA-1 Pulse To Analog Converter

Installation And Operation Manual

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INSTALLATION AND OPERATION MANUAL

DESCRIPTION:

The **PA-1** offers a unique way of adding a single channel of analog output to any PLC. Output voltage (0-5vdc or 0-10vdc) can be adjusted up or down in 1% increments by sending pulses to the **PA-1**. An Up/Down input determines direction. The **PA-1** is powered by 24VDC and provides 1000-volt isolation from input to output. This open loop design is ideal for conveyors and motorized feeders etc.

CONNECTIONS:

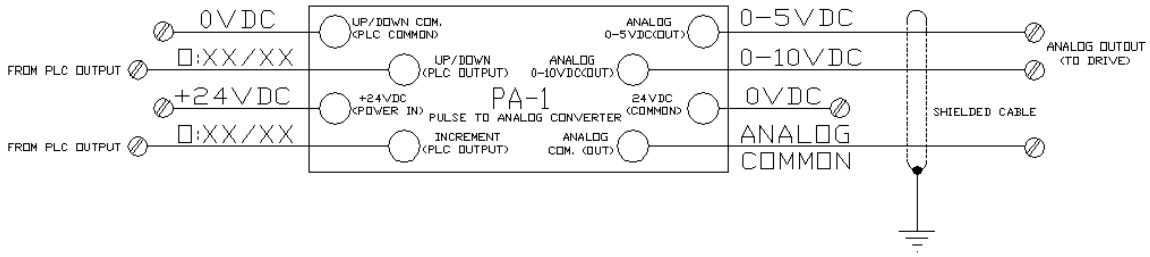
Connect as shown on the diagram on page 2. The supply voltage for the **PA-1** is 24 VDC plus or minus one volt. The maximum current requirement is 30ma. This supply voltage is internally isolated from all other terminals on the **PA-1**, including the connections from the PLC outputs and PLC common. Please note that the connections from PLC outputs can be either source or sink depending on the polarity of the up/down terminal. The connections on the wiring diagram on page 2 show a typical connection to a PLC with sourcing outputs. When connecting the **PA-1** to a motor drive or other load, use either the 0-5V output or the 0-10V output (depending on device requirements) and the analog common. The analog outputs are capable of 5ma continuous output.

PA-1 INSTALATION:

The **PA-1** must be installed in an enclosure approved for the location. Mount the **PA-1** on DIN rail as far as possible from sources of electrical noise. Such sources of electrical noise may include both AC and DC motor controls, switching power supplies and any high current carrying conductors. The **PA-1** should however, be mounted close to the device it is controlling. Electrical noise problems are usually indicated if the connected motor drive or other device will not maintain a steady speed or pulsates during normal operation.

OPERATION

Each pulse received by the **PA-1** will vary the analog outputs by one percent. If the **up/down** output from the PLC is **off**, the analog voltage will rise when each pulse is received. If the **up/down** output from the PLC is **on**, the analog voltage will fall when each pulse is received. The pulses must be a minimum of five milliseconds in width, with at least five milliseconds off time. When changing state of the PLC output controlling up/down, make sure that the PLC **pulse** output has been off for at least two milliseconds. This will prevent the **PA-1** from being confused as to whether a pulse should be up or down. Other devices including switches or relays can control the **PA-1**. Any device capable of supplying 24VDC signals at 10ma can be used. Care must be taken however, when using switches, relays or any hard contact devices because of contact bounce, which may record erroneous pulses. When using these devices additional filtering may be required. The full-scale range of the **PA-1** is 100 pulses. Any additional pulses received in either direction are ignored. The logic example shown on page 3 for an Allen Bradley SLC 500™, always issues a continuous stream of down pulses whenever the **PA-1** is commanded to output 0V. We recommend this approach to programming. This approach ensures that if any erroneous up pulses were received, they will be zeroed out whenever the **PA-1** is commanded to output 0V. This essentially closes the loop and prevents any long-term drift that could occur from high levels of electrical noise etc.



The latest version of this document, **pa1.pdf** is available at **www.arthurgrussell.com**

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This is an example for controlling a feeder with 2 speeds with an Allen Bradley Micrologix 1000
As many speeds as desired can be added. The addresss shown are examples only.
This logic can also be used with the PA-1 Pulse To Analog Converter
Your addresses could be the same or different. All addresses that are labeled as
REPLACE WITH must be replaced with your own I.O. adresses.
B3/410=RAIL HIGH LEVEL INPUT
B3/411=FEEDER OFF/ON INPUT
B3/412=FEEDER UP/DOWN SPEED SELECT OUTPUT
B3/413=FEEDER PULSE IN OUTPUT
B3/414=FEEDER OUT OF TUNE INPUT

0000

****
REPLACE WITH
****
RAIL HIGH LEVEL HERE
****
B3
410

RAIL HIGH LEVEL
Reset Timer
(Restart)
T4:2
DN

RAIL HIGH LEVEL
Slow Down Timer
T4:3
DN

RAIL HIGH LEVEL
Slow Down Timer
TON
Timer On Delay
Timer T4:3
Time Base 0.01
Preset 50<
Accum 0<
EN
DN

RAIL HIGH LEVEL
Delay Feeder
Shut Down
Timer
TON
Timer On Delay
Timer T4:4
Time Base 0.01
Preset 400<
Accum 0<
EN
DN

0001

****
REPLACE WITH
****
RAIL HIGH LEVEL HERE
****
B3
410

RAIL HIGH LEVEL
Slow Down Timer
T4:3
DN

RAIL HIGH LEVEL
Reset Timer
(Restart)
TON
Timer On Delay
Timer T4:2
Time Base 0.01
Preset 50<
Accum 0<
EN
DN

0002

RAIL HIGH LEVEL
Slow Down Timer
T4:3
DN

FEEDER SLOW DOWN
High/Low Speed
(1 = Low Speed)
B3
415

0003

****
REPLACE WITH
****
YOUR FEEDER OFF/ON
****
B3
411

RAIL HIGH LEVEL
Delay Feeder
Shut Down
Timer
T4:4
DN

FEEDER SHUT DOWN
Vibration
Run/Stop
(1=Run)
B3
416

0004

Highlighted Areas Have Been Changed From Previous Version

Binary Counter Adds
1 Count Every PLC
Scan And Is Reset At
4095
ADD
Add
Source A N7:50
0<
Source B 1
1<
Dest N7:50
0<

These changes allow the fastest possible ramp up and ramp down of the VBC 2000, VBC 2500 or PA-1 controller. Speed can be limited by PLC scan time or remote I.O. if used.

0005

Binary Counter Adds
1 Count Every PLC
Scan And Is Reset At
4095
GEQ
Grtr Than or Eql (A>=B)
Source A N7:50
0<
Source B 4095
4095<

Binary Counter Adds
1 Count Every PLC
Scan And Is Reset At
4095
CLR
Clear
Dest N7:50
0<

Any 3 consecutive N7:50 bits may be used. The lower number bits give the fastest response time. In this example, using a Micrologix 1000, the pulse rate is approximately 200Hz. This is the fastest response time that the VBC2000,VBC2500 or PA-1 will accept under ideal conditions with a 50% duty cycle . For reliability, we reccomend a 100 Hz maximum rate to allow for scan time inconsistencies, (5ms On 5ms Off). You can check this with a frequency meter or oscilloscope at the pulse output. Be sure that the FEEDER SHUT DOWN bit is zero so that you will have a continuous pulse stream to measure. Slower response times may be necessary when using remote I.O. If you are unable to achieve a fast enough response time even using bits 0, 1 and 2, the normally open contact in rung 5 can be removed, allowing the 2 normally closed contacts to be 0 and 1. The normally open contact inserts a small wait between UP-DOWN transitions and pulses for better noise immunity and is usually not necessary. When changing these contacts, don't forget to also change the contacts in rung 7 and 12.

0006

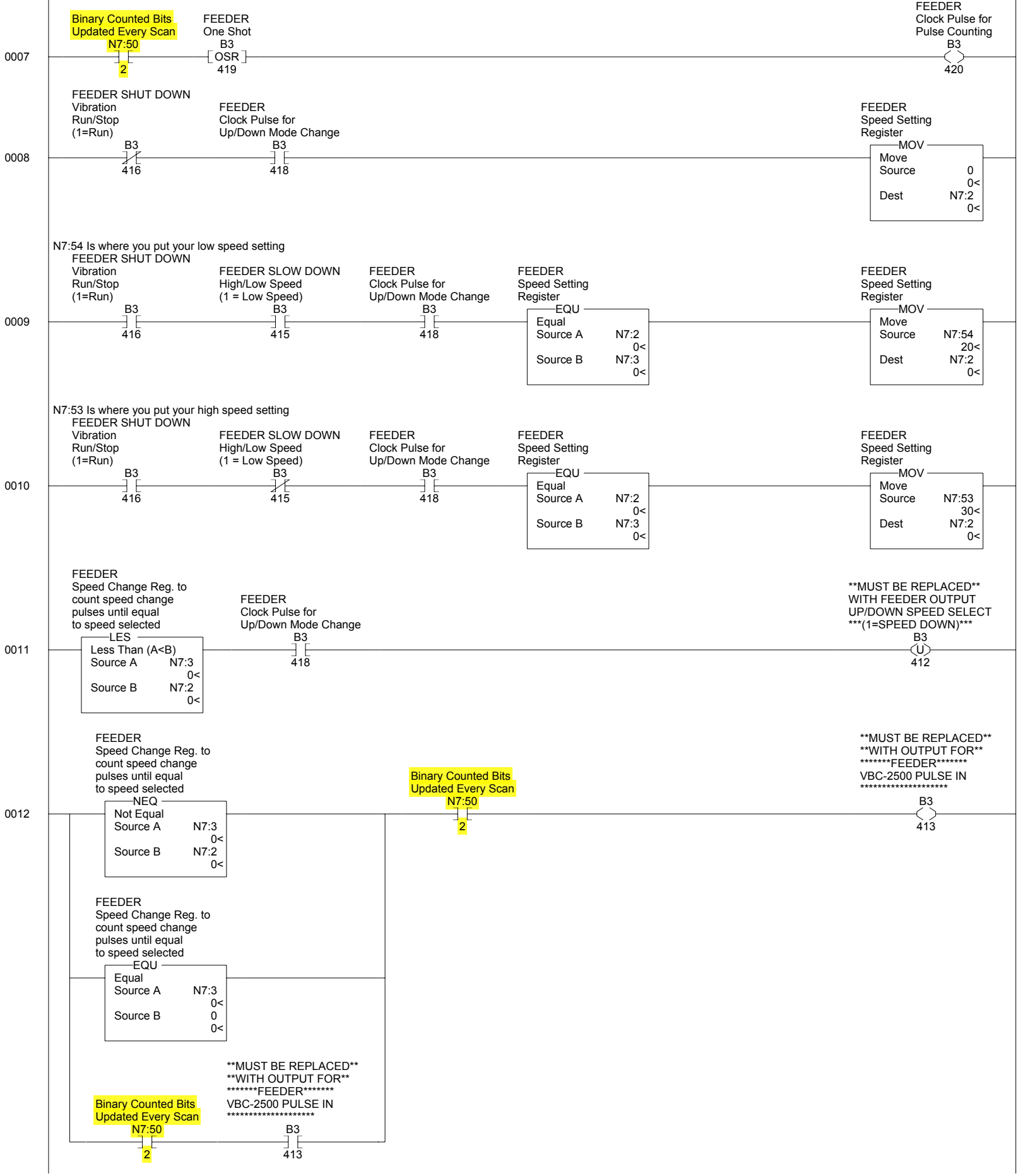
Binary Counted Bits
Updated Every Scan
N7:50
1

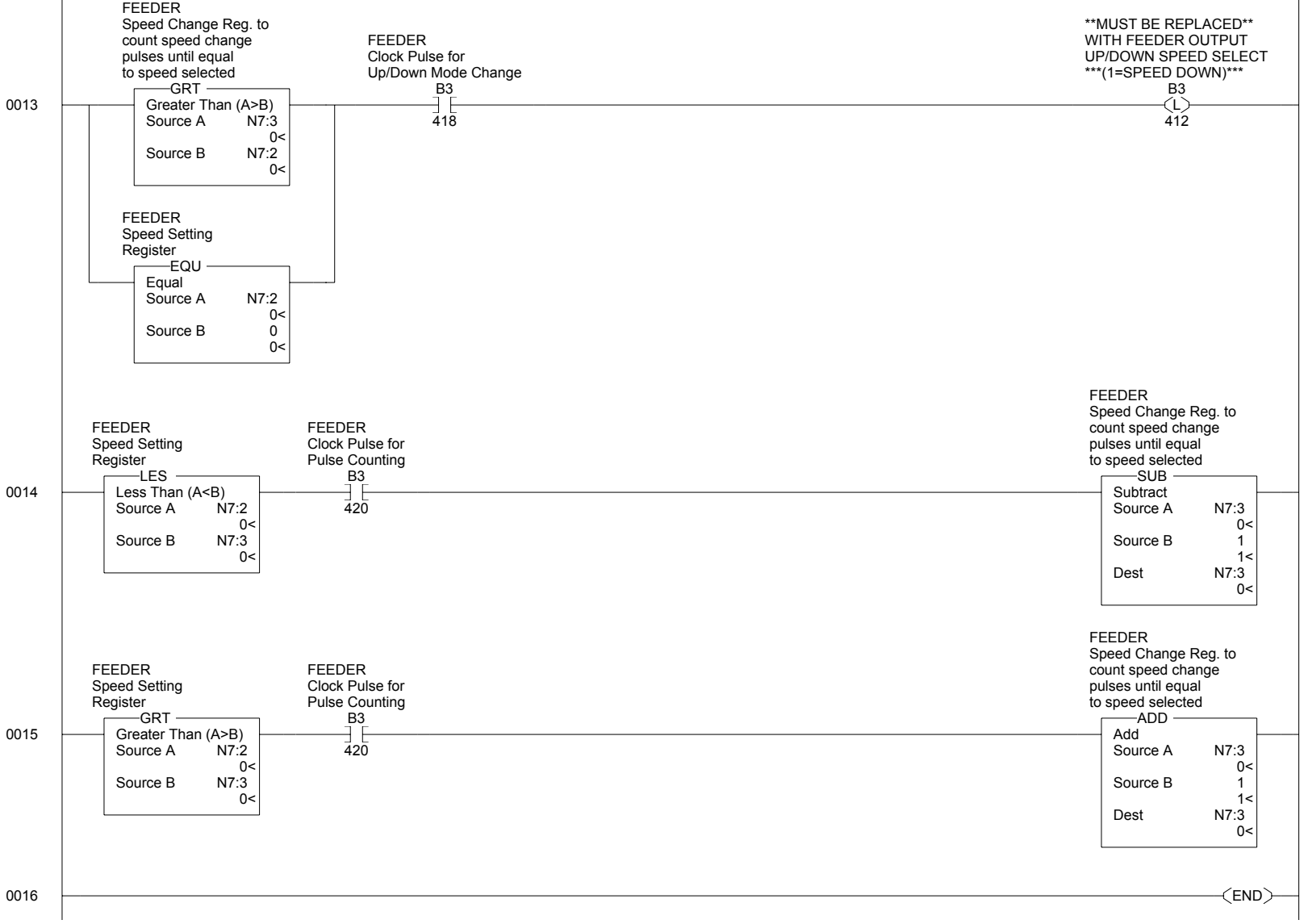
Binary Counted Bits
Updated Every Scan
N7:50
2

Binary Counted Bits
Updated Every Scan
N7:50
3

FEEDER
One Shot
B3
OSR
417

FEEDER
Clock Pulse for
Up/Down Mode Change
B3
418


0007
Binary Counted Bits Updated Every Scan
N7:50
2
FEEDER One Shot
B3
OSR
419
FEEDER Clock Pulse for Pulse Counting
B3
420
0008
FEEDER SHUT DOWN Vibration Run/Stop (1=Run)
B3
416
FEEDER Clock Pulse for Up/Down Mode Change
B3
418
FEEDER Speed Setting Register
MOV
Move
Source 0
0<
Dest N7:2
0<
N7:54 Is where you put your low speed setting
0009
FEEDER SHUT DOWN Vibration Run/Stop (1=Run)
B3
416
FEEDER SLOW DOWN High/Low Speed (1 = Low Speed)
B3
415
FEEDER Clock Pulse for Up/Down Mode Change
B3
418
FEEDER Speed Setting Register
EQU
Equal
Source A N7:2
0<
Source B N7:3
0<
FEEDER Speed Setting Register
MOV
Move
Source N7:54
20<
Dest N7:2
0<
N7:53 Is where you put your high speed setting
0010
FEEDER SHUT DOWN Vibration Run/Stop (1=Run)
B3
416
FEEDER SLOW DOWN High/Low Speed (1 = Low Speed)
B3
415
FEEDER Clock Pulse for Up/Down Mode Change
B3
418
FEEDER Speed Setting Register
EQU
Equal
Source A N7:2
0<
Source B N7:3
0<
FEEDER Speed Setting Register
MOV
Move
Source N7:53
30<
Dest N7:2
0<
0011
FEEDER Speed Change Reg. to count speed change pulses until equal to speed selected
LES
Less Than (A<B)
Source A N7:3
0<
Source B N7:2
0<
FEEDER Clock Pulse for Up/Down Mode Change
B3
418
MUST BE REPLACED WITH FEEDER OUTPUT UP/DOWN SPEED SELECT ***(1=SPEED DOWN)***
B3
U
412
0012
FEEDER Speed Change Reg. to count speed change pulses until equal to speed selected
NEQ
Not Equal
Source A N7:3
0<
Source B N7:2
0<
Binary Counted Bits Updated Every Scan
N7:50
2
MUST BE REPLACED **WITH OUTPUT FOR** *******FEEDER******* VBC-2500 PULSE IN **********
B3
413
FEEDER Speed Change Reg. to count speed change pulses until equal to speed selected
EQU
Equal
Source A N7:3
0<
Source B 0
0<
Binary Counted Bits Updated Every Scan
N7:50
2
MUST BE REPLACED **WITH OUTPUT FOR** *******FEEDER******* VBC-2500 PULSE IN **********
B3
413


FEEDER
Speed Change Reg. to
count speed change
pulses until equal
to speed selected
GRT
Greater Than (A>B)
Source A N7:3
0<
Source B N7:2
0<
FEEDER
Clock Pulse for
Up/Down Mode Change
B3
418
MUST BE REPLACED
WITH FEEDER OUTPUT
UP/DOWN SPEED SELECT
(1=SPEED DOWN)
B3
L
412
0013
FEEDER
Speed Setting
Register
EQU
Equal
Source A N7:2
0<
Source B 0
0<
FEEDER
Speed Setting
Register
LES
Less Than (A<B)
Source A N7:2
0<
Source B N7:3
0<
FEEDER
Clock Pulse for
Pulse Counting
B3
420
FEEDER
Speed Change Reg. to
count speed change
pulses until equal
to speed selected
SUB
Subtract
Source A N7:3
0<
Source B 1
1<
Dest N7:3
0<
0014
FEEDER
Speed Setting
Register
GRT
Greater Than (A>B)
Source A N7:2
0<
Source B N7:3
0<
FEEDER
Clock Pulse for
Pulse Counting
B3
420
FEEDER
Speed Change Reg. to
count speed change
pulses until equal
to speed selected
ADD
Add
Source A N7:3
0<
Source B 1
1<
Dest N7:3
0<
0015
0016
END