YASKAWA

A World of Automation Solutions™

CUSTOM SOFTWARE DESCRIPTION

DC INJECTION AND TRIM CONTROL

Software Number: VSP018262 / VSP018252	Base Version: VSP010026 / VSP010105	
Product: V7 Low & High HP	Model Number: CIMR-V7AUXXXX1-052	
Release Date: 5/14/03	Author: Ty Phillips	☐Beta Version
Overview: Full range DC injection and DC injection via multi-function input functions are added. Trim control increase/decrease by multi-function input is also included. This manual covers both the low horsepower version VSP018262 and the high horsepower version VSP018252.		
Revision History:		

1.0 Overview:

This software adds full range DC injection, as well as a DC injection command as a multi-function input selection. DC injection causes DC current to flow in the motor windings, which aligns the motor poles and provides deceleration and/or holding torque.

A trim control feature for the frequency reference (similar to the GPD515/G5 function) is also included. This allows for increasing or decreasing (trimming) of the frequency reference by a programmed amount through a multi-function input contact closure.

2.0 Related Parameters:

No.	Modbus Address	Parameter Description	Unit	Setting Range	Default
n005	0105H	Stop Method: 0: Ramp to stop 1: Coast to stop **2: Full range DC injection**	-	0 ~ **2**	0
n045	012DH	Trim control level at maximum frequency (n011). 100% = n011 (maximum frequency).	0.1%	0.0 ~ 100.0 [*1]	10.0
n046	012EH	Trim control level at minimum frequency (n016). 100% = n011 (maximum frequency).	0.1%	0.0 ~ 100.0 [*1]	10.0
n089	0159H	DC Injection Current	1%	0 ~ 100	50
n090	0015A	DC Injection Time at Stop	0.1 sec	0 ~ 25.5	0.0
n091	0015B	DC Injection Time at Start	0.1 sec	0 ~ 25.5	0.0
n170	01AAH	Minimum Baseblock Time	0.1 sec	0.1 ~ 1.0	0.5

*1: It is not possible to set n045 less than n046 or to set n046 greater than n045. . If n045 < n046 due to setting by communication, an "oP9" alarm will be displayed.

3.0 Additional Multi-function Input Settings (n050 ~ n056):

Setting	Description
28	DC Injection Command
29	Trim Control Increase
30	Trim Control Decrease

When n050 ~ n056 = 28, the corresponding input terminal (S1 ~ S7) is used for commanding DC Injection.

When n050 ~ n056 = 29/30, the corresponding input terminals (S1 ~ S7) are used for the frequency reference trim control increase/decrease function.

4.0 Description of Functionality:

4.1 Full Range DC Injection

When n005 = 2 and the run command is removed, the drive will Baseblock for the time in parameter n170 (Minimum Baseblock Time) and then apply DC injection. The DC injection time is based on n090 (DC Injection Time at Stop) and output frequency as shown below. Although the minimum Baseblock time can be set as low as 0.1 Sec, caution should be observed when setting this parameter to avoid Overvoltage or Overcurrent faults. The acceptable minimum setting will vary based on the motor and application.
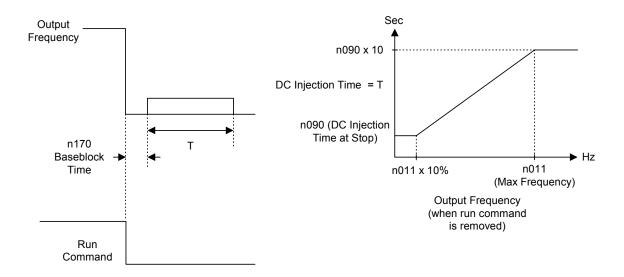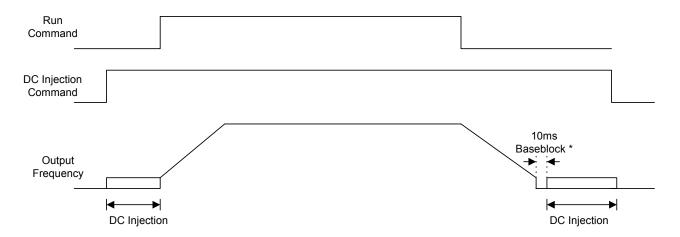

Figure 1.0 Full Range DC Injection Timing Chart and Time Calculation Graph

4.2 DC Injection Multi-function Digital Input Command

- The DC Injection command will be active under the following conditions: the inverter is ready (i.e. not in program mode or in a fault state), no run command is present, and the output frequency is less than the Minimum Frequency (n016).
- The DC Injection Current Level is set by the standard parameter n089 (as a percentage of inverter rated current).
- The DC Injection at Start and DC Injection at Stop parameters n090 and n091 have priority over the external DC Injection command.
- Full range DC injection (n005 = 2) has priority over the external DC Injection command.
- The External Baseblock command has priority over the external DC Injection command.
- The RUN LED on the digital operator will be lit solid when the DC injection command is closed.

* To prevent the 10ms Baseblock at the end of deceleration, set the DC Injection Time at Stop (n090) to 0.1 sec.

Figure 2.0 Multi-function Input DC Injection Command Timing Chart

4.3 Frequency Reference Trim Control Function

When the trim control increase multi-function input is closed, the control trim level will be added to the frequency reference. When the trim control decrease multi-function input is closed, the trim control level will be subtracted from the frequency reference. The inverter must be in remote mode and the frequency reference must be non-digital (n004 ≠ 1) for trim control to function. Also, trim control is disabled when any of the multi-step speed reference inputs are closed. The trim control level is determined by the frequency reference, n045 (Trim Control Level at Max Frequency), and n046 (Trim Control Level at Min Frequency). See Figures 3.0 and 4.0 below.
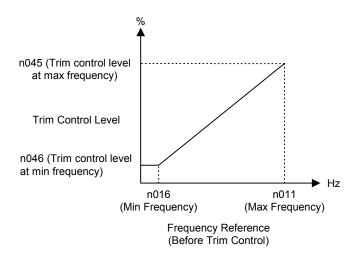

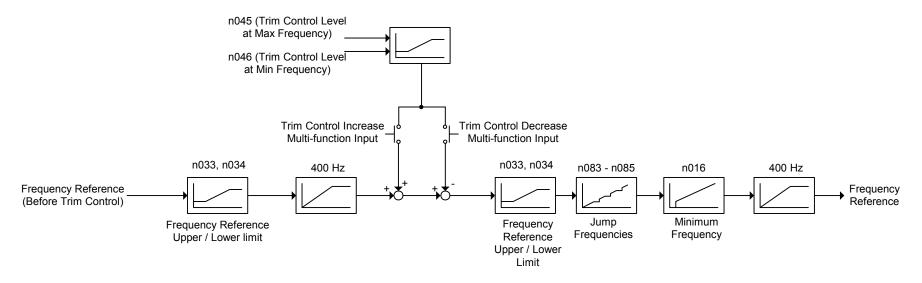**Figure 3.0 Frequency Reference Trim Control Level Calculation Graph**

Figure 4.0 Frequency Reference Block Diagram Including Trim Control