

YASKAWA AC Drive - V1000

Traverse Application Custom Software Supplement

Software Number: VSV91004□

Drive Models: VU□A□□□□□□□□

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

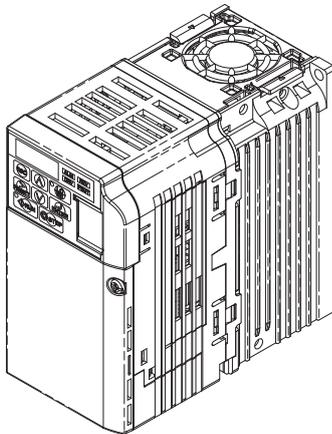


Table of Contents

1 PREFACE AND SAFETY	5
2 PRODUCT OVERVIEW	8
3 NEW AND MODIFIED SOFTWARE FUNCTIONS	9

Refer to the V1000 Technical Manual for content not described in this document.

This Page Intentionally Blank

1 Preface and Safety

Yaskawa manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of Yaskawa products remain the responsibility of the equipment manufacturer or end user. Yaskawa accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any Yaskawa product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All systems or equipment designed to incorporate a product manufactured by Yaskawa must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by Yaskawa must be promptly provided to the end user. Yaskawa offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the Yaskawa manual. **NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED.** Yaskawa assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

1 Preface and Safety

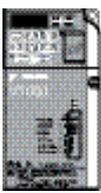
◆ Applicable Documentation

The following manuals are available for the V1000 Drive:

Custom Software Supplement

	Yaskawa AC Drive - Traverse Application V1000 Custom Software Supplement Manual No: TM.V1000SW.029
	Read this supplement first. This supplement is an addendum to the V1000 Quick Start Guide and Technical Manual. It lists the effects of this custom software on the parameters in the drive and function descriptions in the manual. To obtain a PDF of this supplement, access this site: U.S: http://www.yaskawa.com

Yaskawa Drive

	Yaskawa AC Drive - V1000 Quick Start Guide	To obtain instruction manuals for Yaskawa products access these sites: U.S.: http://www.yaskawa.com Other areas: contact a Yaskawa representative. For questions, contact the local Yaskawa sales office or the nearest Yaskawa representative.
	Yaskawa AC Drive - V1000 Technical Manual	

◆ Supplemental Safety Information

Read and understand this manual and the V1000 Quick Start Guide before installing, operating, or servicing the drive. The drive must be installed according to the V1000 Quick Start Guide and local codes. Observe all cautions and warnings in this document and the standard drive technical manuals.

Refer to the V1000 Quick Start Guide and the V1000 Technical Manual for safety information and installation and start-up instructions.

This supplement describes the effects of the Traverse Application software on the standard drive parameters and functions.

- Custom software is provided to add functionality to a standard AC drive to enhance or enable use in a specific application.
- The software is loaded to the flash ROM area of the control board, and replaces the standard drive software.

◆ Obtaining Support

The part number shown on the drive nameplate must be provided when seeking support for a drive with custom software. The software is flashed to the control board memory and the operation of parameters, functions, and monitors are different than the standard drive software, as described herein.

Refer to Yaskawa office locations listed on the back cover of this supplement.

2 Product Overview

◆ About This Product

This custom software is designed specifically for use in Traverse applications.

◆ Applicable Models

This custom Traverse application software is available for the V1000 drive models listed in [Table 1](#).

Table 1 Applicable Models

Voltage Class	Models	Software Version <1>
200 V Single-Phase	VUBA0001F□□ to BA0018F□□	VSV91004□
200 V Three-Phase	VU2A0001F□□ to 2A0069F□□	VSV91004□
400 V Three-Phase	VU4A0001F□□ to 4A0038F□□	VSV91004□

<1> See “PRG” on the drive nameplate for the software version number.

3 New and Modified Software Functions

◆ Traverse Anti-Phase

■ Overview

The Traverse Anti-Phase function controls the traverse arm of a winder in textile industry applications. This function generates a dithered disturbed waveform that is used as frequency reference for the traverse arm drive and also provides an anti-phase signal for output to a spindle slave drive for better winding.

■ Basic Concept

When the drive reaches the set frequency reference, the output frequency waveform is modulated in a triangular pattern to randomize fiber overlap on the spindle and produce a tighter wrap and higher quality wound package.

P1-□□ parameters set the attributes of the disturbed waveform, a triangle wave with instantaneous jumps at the peak and trough. This triangle wave rides on top of the base frequency reference for the traverse drive.

The signal output to control the slave spindle drive can be set to one of three monitors: U7-02, Absolute Slave Frequency, U7-03, Ripple Slave Frequency, or U7-04, Slave Base Frequency. U7-02 and U7-03 have an anti-phase component and output a disturbed waveform that is the inverse (anti-phase) of the master disturbed waveform. The anti-phase waveform ignores the jump portion of the master traverse disturbed waveform.

■ Limitations

- This software substitutes English text for Japanese when Japanese is selected (A1-00 = 1). Chinese language support (A1-00 = 7) has been removed.
- Parameter L4-02, Speed Agree Detection Width, should be set to a small, non-zero value to avoid unintended jumps in the disturbed waveforms.
- When P1-04 and P1-05 are set to short slope times, set L4-02 to a value greater than 0.5 Hz to prevent inconsistent traverse operation.
- Step changes in frequency reference result in unintended jumps in the disturbed waveforms. Disable the Traverse function using H1-□□ = 80h to prevent damage to the motor or connected equipment before making large changes in the frequency reference.
- The Traverse waveform can be configured to be smaller than the input resolution of the V1000 slave drive frequency reference. Ensure that Master Frequency Reference \times P1-02 is significantly larger than (Slave Maximum Output Frequency/1000) for proper control of the slave drive.

3 New and Modified Software Functions

■ Related Parameters and Functions

Table 2 Modified Parameter

No.	MEMOBUS/ Modbus Address	Name Digital Operator Display	Description	Range	Default Value
A1-00	0100h	Language Selection Select Language	0: English 1: Japanese 2: German 3: French 4: Italian 5: Spanish 6: Portuguese	0 to 6	0

Table 3 Additional Parameters

No.	MEMOBUS/ Modbus Address	Name Digital Operator Display	Description	Range	Default Value
P1-01	0600h	Disturbed P1-05 Waveform Selection Disturb WF Sel	Enables and disables the traverse disturbed waveform function. 0: Disabled 1: Enabled	0, 1	0
P1-02	0601h	Disturbed Waveform Amplitude Disturb WF Amp	Sets the amplitude of the disturbed waveform as a percentage of the commanded frequency reference. Note: Setting this parameter to 0 disables the Traverse function.	0.0 to 20.0%	0.0
P1-03	0602h	Disturbed Waveform Jump Disturb WF Jmp	Adds a notch or “jump” below the peak amplitude of the disturbed waveform when set to a non-zero value. Set as a percentage of P1-02, Disturbed Waveform Amplitude.	0.0 to 50.0%	0.0
P1-04	0603h	Negative Slope Time Neg Slope Time	Sets the time for the disturbed waveform to decelerate from the maximum value (reference + P1 02) to the minimum value (reference - P1-02). Note: Setting this parameter to 0.0 disables the Traverse function.	0.0 to 120.0 s	0.0
P1-05	0604h	Positive Slope Time Pos Slope Time	Sets the time for the disturbed waveform to accelerate from the minimum value (reference - P1 02) to the maximum value (reference + P1-02). Note: Setting this parameter to 0.0 disables the Traverse function.	0.0 to 120.0 s	0.0
P1-06	0605h	Slave Scan Offset Slv Scan Offset	Monitors shift (U7-02, U7-03, and U7-04) in ms to compensate for systematic delays.	-24 to 24 ms	0

Note: All additional P1 parameters can be changed during run.

3 New and Modified Software Functions

Table 4 Additional Parameter Function Group

Function Group	Group Name Digital Operator Display
P	Traverse Group Traverse

Table 5 Additional Parameter Function Number

Function No.	Description
P1	Disturbed Waveform Adjustment Disturb WF Adj

Table 6 Additional Monitor Function Number

Function No.	Description
U7	Traverse Monitors Traverse

Table 7 Additional Monitors

No.	MEMOBUS/ Modbus Address	Name Digital Operator Display	Description	Analog Output Scaling	Unit
U7-02	0661h	Absolute Slave Frequency Slv Abs Freq	Base frequency reference summed with the anti-phase dither.	10 V: Max Frequency (E1-04)	0.01 Hz
U7-03	0662h	Ripple Slave Frequency Slv Ripple Freq	Anti-phase dither summed with 50% of E1-04. During reverse operation, displays a negative frequency reference. The analog output will remain positive for both run directions.	10 V: Max Frequency (E1-04)	0.01 Hz
U7-04	0663h	Base Slave Frequency Slv Base Freq	Base frequency reference (before disturbed waveform is applied).	10 V: Max Frequency (E1-04)	0.01 Hz

Table 8 Additional Multi-Function Input Settings (H1-□□)

No.	Description
80h	Disturbed WF Off Open: Disturbed waveform enabled Closed: Disturbed waveform disabled

3 New and Modified Software Functions

Table 9 Additional Multi-Function Output Settings (H2-□□)

No.	Description
40h	Disturb UP Sts Open: The disturbed waveform frequency is decreasing Closed: The disturbed waveform frequency is increasing
41h	During Disturb Open: Disturbed waveform disabled Closed: Disturbed waveform being generated

■ Function Description

The disturbed waveform begins when the drive reaches Speed Agree (bandwidth adjustable by parameter L4-02). The disturbed waveform rides on top of the base frequency reference for the traverse drive.

Adjusting the frequency reference of the master drive while the disturbed waveform is active produces an output that is the frequency reference waveform summed with the disturbed waveform.

The dithering is a triangle waveform with amplitude and slope set by P1-02, P1-04, and P1-05. The traverse drive also has a jump in the dithering waveform set by parameter P1-03.

The anti-phase output signal is the disturbed portion of the traverse frequency reference with the signal inverted. Only the triangle portion of the disturbed waveform is used for the anti-phase output; the jump is ignored.

The Traverse application software has three monitors: U7-04, Base Slave Frequency, outputs the frequency reference of the drive before the disturbed waveform is applied; U7-03, Ripple Slave Frequency, outputs the anti-phase of the disturbed portion of the waveform summed with 50% of Maximum Output Frequency parameter E1-04; and U7-02, Absolute Slave Frequency, outputs the anti-phase of the disturbed portion of the waveform summed with U7-04.

All three monitors can be set to analog outputs, however U7-02 or U7-03 would generally be used as an analog output going to the slave (spindle) for the frequency reference. U7-02 provides the slave with a complete reference signal. U7-03 is used as a dither reference if the slave should use its own base frequency reference (as shown in the [Application Example on page 13](#)).

To compensate for system delays, U7-02, U7-03, and U7-04 can be set to lead or lag the traverse control output by 0 to 12 scans (0 to 24 ms) using parameter P1-06.

■ Application Example

In the application shown in [Figure 1](#), the slave drive is configured to run at its own frequency reference provided at terminal A1. The Anti-Phase Slave Ripple Frequency component is connected to analog input terminal A2 of the slave drive, with terminal bias and offset set so that the Slave Ripple Frequency component alone will be a bipolar signal oscillating around 0 Hz. This signal, summed with the Slave Frequency Reference at terminal A1, sets the overall frequency reference for the drive.

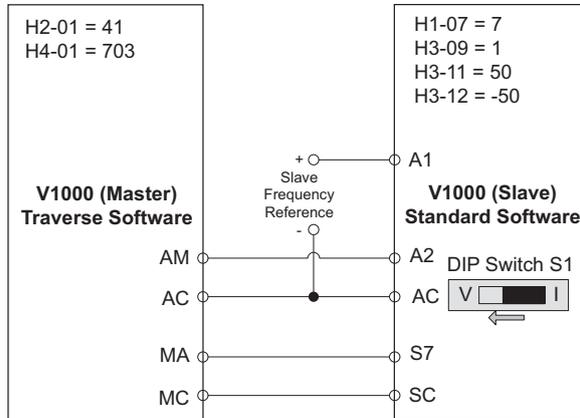


Figure 1 Software and Hardware Configuration for V1000 Traverse

Master Parameter Changes:

- P1-01 = 1: Enable Traverse functionality.
- P1-02 to P1-05 = application requirements: Define the characteristics of the disturbed frequency.
- P1-06 = application requirement: Define scan offset to account for system delays.
- H2-01 = 41h: Provide during disturb status output to slave.
- H4-01 = 703: Provide disturbed frequency ripple to slave.

Slave Parameter Changes

- C1-03 = 0.0 sec: Set acceleration time 2 to 0.0 sec.
- C1-04 = 0.0 sec: Set deceleration time 2 to 0.0 sec.
- H1-07 = 7: Switch between accel/dec time 1/2 based on During Disturb output.
- DIP Switch S1 = V: Enable voltage input to A2.
- H3-09 = 1: Set A2 to a 0 to 10V bipolar input.
- H3-11 = 50.0%: Set the gain to equate a 10 V signal to 30 Hz (50% of E1-04).
- H3-12 = -50.0%: Set the bias to equate a 0 V signal to -30 Hz (-50% of E1-04).

3 New and Modified Software Functions

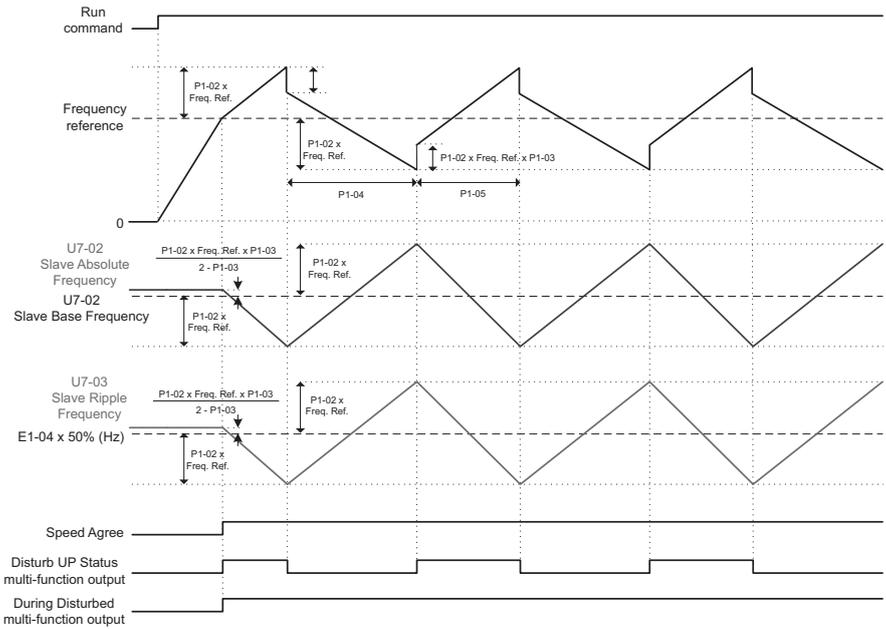


Figure 2 Master and Slave Output Diagram: Standard Operation

■ Implementation

Situation 1: Standard Operation

When programmed with the settings shown in [Table 10](#), the Traverse software produces output waveforms similar to the ones in [Figure 2](#). Using these settings and a reference frequency of 45 Hz, the master drive operates based on the triangle waveform with 9 Hz peak amplitude. Because the waveform is centered on the 45 Hz reference frequency, the master waveform oscillates between 36 and 54 Hz while in Traverse mode.

Table 10 Sample Operating Parameters

Parameter	Name	Setting
P1-01	Disturbed P1-05 Waveform Selection	1
P1-02	Disturbed Waveform Amplitude	20.0%
P1-03	Disturbed Waveform Jump	50.0%
P1-04	Negative Slope Time	5.0 s
P1-05	Positive Slope Time	4.0 s

3 New and Modified Software Functions

Parameter	Name	Setting
P1-06	Slave Scan Offset	0 ms

U7-02, Slave Absolute Frequency, (available as an output to the slave by setting parameter H4-01 to 702), has the same amplitude of 9 Hz (calculated by P1-02 \times Reference Frequency). U7-02 is anti-phase to the master waveform and is centered around U7-04, the Slave Base Frequency. Since the Slave Base Frequency is 45 Hz, U7-02 varies from 36 to 54 Hz while in Traverse mode. Before entering Traverse mode, the Slave Absolute Frequency rests at 48 Hz as represented by the equation in [Figure 2](#).

U7-03, Slave Ripple Frequency, is similar to U7-02, except that this anti-phase dither is centered around 50% of the drive Maximum Output Frequency. With E1-04 set to 60.0 Hz, U7-03 is centered around 30 Hz, and varies from 21 to 39 Hz during operation. Before entering Traverse mode, the Slave Ripple Frequency rests at 33 Hz, as represented by the equation in [Figure 2](#).

Situation 2: Traverse Operation Exceeds Maximum Output Frequency

Using the settings in [Table 10](#) and a reference frequency of 52 Hz, the Traverse software produces output waveforms similar to those in [Figure 3](#). With an amplitude of 10.4 Hz, the traverse software produces a triangle output that varies from 41.6 to 62.4 Hz. Setting drive parameter E1-04 to 60.0 Hz, caps the triangle waveform when the traverse frequency exceeds the Maximum Output Frequency of 60 Hz.

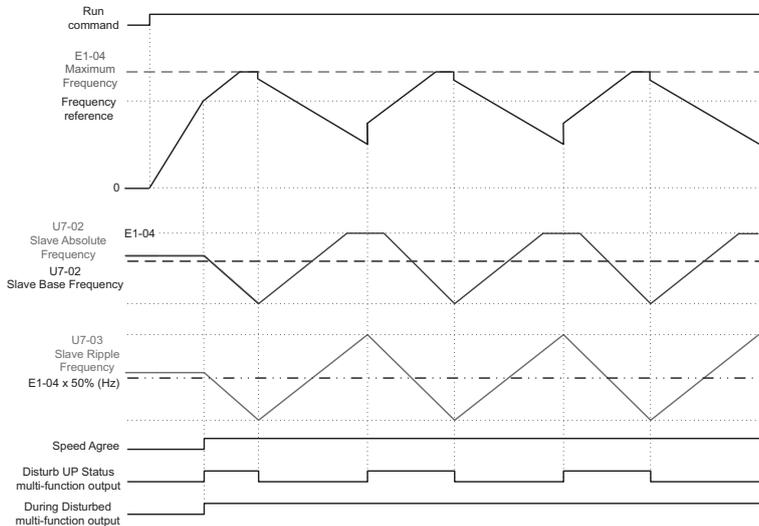


Figure 3 Traverse Mode Operation Outside of Maximum Output Frequency E1-04/E3-04

3 New and Modified Software Functions

Situation 3: Changing Reference Frequency

Using the settings in [Table 10](#) and a reference frequency that changes from 20 Hz to 30 Hz, the Traverse software produces output waveforms similar to those in [Figure 4](#). Using a 20 Hz frequency reference, the master drive oscillates between 16 and 24 Hz. When the reference frequency increases to 30 Hz, the drive exits Traverse mode and accelerates using the default acceleration time set in C1-01. When the drive reaches the new frequency reference, it re-enters Traverse mode and the master drive oscillates between 24 and 36 Hz.

Initially, U7-02, Slave Absolute Frequency, rests at 21.33 Hz. When the drive enters Traverse mode, U7-02 oscillates between 16 and 24 Hz. When the reference frequency changes, the drive exits Traverse mode and the Slave Absolute Frequency rises to 32 Hz until the drive re-enters Traverse mode. Once resuming traverse mode, the new waveform oscillates between 24 and 36 Hz.

U7-03, Slave Ripple Frequency, operates similar to U7-02, except that its waveform is centered around $[50\% \times E1-04]$, which does not change with the reference frequency.

Step changes in frequency reference result in unintended jumps in the disturbed waveforms. Disable the Traverse function using H1-□□ = 80h to prevent damage to the motor or connected equipment before making large changes in the frequency reference.

3 New and Modified Software Functions

◆ Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.

MANUAL NO. TM.V1000SW.029

Published in U.S.A. March 2013 13-3 

└─ Date of publication └─ Date of original publication └─ Revision number

Date of Publication	Revision Number	Software Number	Revised Content
March 2013	-	VSV91004□	First release

YASKAWA AC Drive - V1000

Traverse Application

Custom Software Supplement

YASKAWA AMERICA, INC.

2121 Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone: (800) YASKAWA (927-5292) or 1-847-887-7000 Fax: 1-847-887-7310
<http://www.yaskawa.com>

DRIVE CENTER (INVERTER FLUCT)

2-13-1, Nishimiyachi, Yukuhashi Fukuoka, 824-8511, Japan
Phone: 81-930-25-3844 Fax: 81-930-25-4369
<http://www.yaskawa.co.jp>

YASKAWA ELECTRIC CORPORATION

New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo, 105-6891, Japan
Phone: 81-3-5402-4502 Fax: 81-3-5402-4580
<http://www.yaskawa.co.jp>

YASKAWA ELÉTRICO DO BRASIL LTDA.

Avenda Fagundes Filho, 620 Bairro Saude, São Paulo, SP04304-000, Brasil
Phone: 55-11-3585-1100 Fax: 55-11-5581-8795
<http://www.yaskawa.com.br>

YASKAWA EUROPE GmbH

Hauptstrasse 185, 65760 Eschborn, Germany
Phone: 49-6196-569-300 Fax: 49-6196-569-398
<http://www.yaskawa.eu.com>

YASKAWA ELECTRIC UK LTD.

1 Hunt Hill Orchardton Woods, Cumbernauld, G68 9LF, United Kingdom
Phone: 44-1236-735000 Fax: 44-1236-458182
<http://www.yaskawa.co.uk>

YASKAWA ELECTRIC KOREA CORPORATION

7F, Doore Bldg, 24, Yeoido-dong, Yeongdungpo-gu, Seoul, 150-877, Korea
Phone: 82-2-784-7844 Fax: 82-2-784-8495
<http://www.yaskawa.co.kr>

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.

151 Lorong Chuan, #04-01, New Tech Park, 556741, Singapore
Phone: 65-6262-3003 Fax: 65-6269-3003
<http://www.yaskawa.com.sg>

YASKAWA ELECTRIC (SHANGHAI) CO., LTD.

No. 18 Xizang Zhong Road, 17F Harbour Ring Plaza, Shanghai, 200001, China
Phone: 86-21-5385-2200 Fax: 86-21-5385-3299
<http://www.yaskawa.com.cn>

YASKAWA ELECTRIC (SHANGHAI) CO., LTD. BEIJING OFFICE

Room 1011, Tower W3 Oriental Plaza, No. 1 East Chang An Ave.,
Dong Cheng District, Beijing, 100738, China
Phone: 86-10-8518-4086 Fax: 86-10-8518-4082

YASKAWA ELECTRIC TAIWAN CORPORATION

9F, 16, Nankang E. Rd., Sec. 3, Taipei, 104, Taiwan
Phone: 886-2-2502-5003 Fax: 886-2-2505-1280



YASKAWA AMERICA, INC.

In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

© 2013 YASKAWA AMERICA, INC. All rights reserved.



TM V1000SW 028

MANUAL NO. TM.V1000SW.029

Published in U.S.A. March 2013 13-3