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CUSTOM SOFTWARE DESCRIPTION

TEXTILE FIBER WINDER SOFTWARE

V7 Low HP (0.4 – 3.7 kW)

Software Number: VSP018070		**Base Version:** VSP0010024
Product: V7		**Part Number:** CIMR-V7AMXXXX-032
Release Date: 1/31/01	**Author:** Ty Phillips	☐Beta Version
Overview: Frequency reference selection is added for winder ratio reference. Reference is written via a Memobus broadcast command, multiplied by a four digit numerator and divided by a four digit denominator. Support for Memobus function code 06H is added.		
Revision History:		

Background and Application Information:

Traditional fiber winding uses one of several methods to control traverse motor speed: Classical precision winding, random winding, or pattern jump (also referred to as ribbon breaking).

In classical precision winding, the spindle and traverse motors are kept at a constant ratio, usually by mechanical gearing. This ratio is typically on the order of about three decimal places because more common ratios (integer or sub-integer) cause multiple wraps of thread to lay on top of each other, forming what is known as a "ribbon" defect. Classical precision winding produces the highest quality package, but has several drawbacks. Winders employing this technique cannot operate at high speeds due to mechanical limitations of the traverse guide. Also, these systems require several different stages of belting to achieve the unusual gear ratios, resulting in increased mechanical complexity.

Random winding permits much higher speeds because the traverse motor speed is held constant. Since the spindle motor speed is constantly changing the laying of the fibers appears random. However, the resulting package is not as dense as a precision wound package and tends to form ribbons.

Pattern jump, or ribbon breaking, has the high-speed benefits of random winding but produces a higher quality package. This method oscillates the traverse motor speed in a sawtooth fashion such that the motor speed will only briefly pass through "bad" ratio areas as the package diameter builds, reducing the number of ribbons. This is the method used in Yaskawa "P-jump" or "traverse" software.

This software is designed to electronically control the spindle and traverse drive output frequencies to run at a precise ratio. A PLC writes the frequency reference to both drives simultaneously via a Memobus broadcast command. Two parameters (changeable during run) are provided to ratio this speed reference. The PLC changes the traverse drive ratio parameters during operation via Memobus. Synchronous motors are used so the commanded speeds are accurate. The spindle and traverse drives accel/decel times are programmed identically such that their output frequencies change at the same rate. By periodically changing the speed ratio between the spindle and traverse drives, the "bad" ratios can be avoided. This method permits high-speed winding and creates a package that is close in quality to the classical precision wound package.

Fig. 1 – Diagram of Application
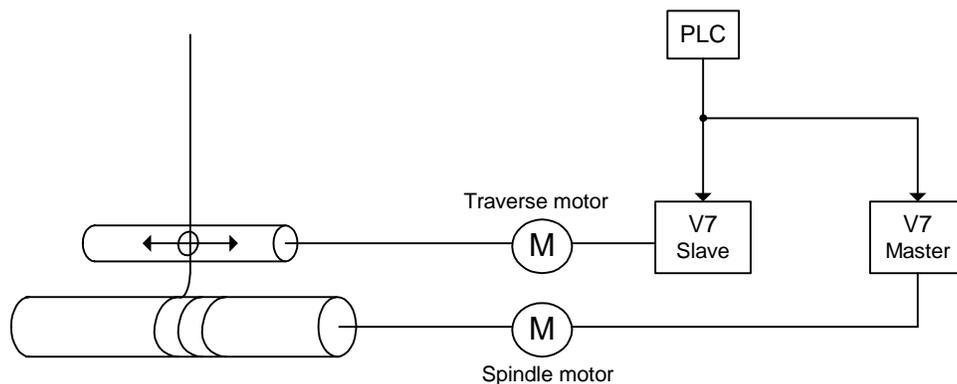
Additional Parameters:

No.	Memobus No.	Parameter Description	Unit	Setting Range	Default	Access Level	Change During Run
n045	012DH	Ratio Numerator	-	1 ~ 9999	1	1st function	Y
n046	012EH	Ratio Denominator	-	1 ~ 9999	1	1st function	Y

Parameters n045 and n046 apply a ratio to the winder frequency reference.

Additional Reference Selection Setting:

Setting	Description
10	Winder ratio reference

When n004 = 10, the inverter frequency reference will be given by the winder ratio reference.

Additional Memobus Register:

Memobus No.	Parameter Description	Unit
0004H	Winder frequency reference	1 = 0.01Hz

This register is *only* accessible using a Memobus broadcast command (slave address 0), so no response message will be sent to the master. Any word length data is considered valid data; if the post-ratio reference is greater than n011 (max frequency), the commanded reference will be n011 (See Fig. 2).

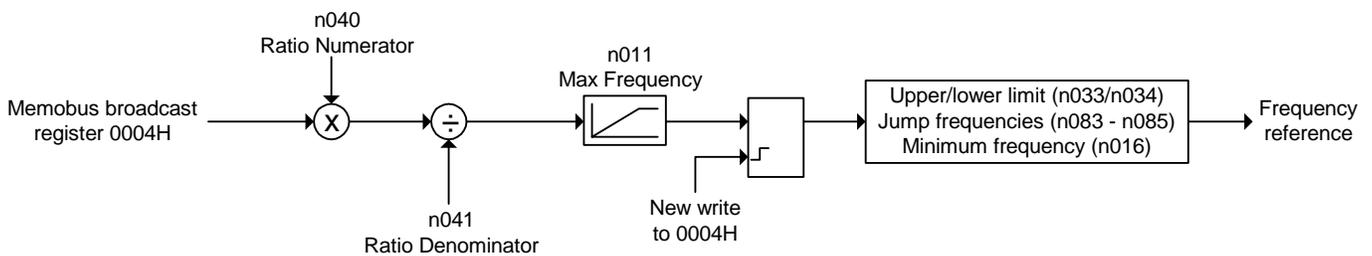**Detailed Description of Functionality:**

Ratio Function

When n004 = 10, the frequency reference is given by the Memobus broadcast register 0004H multiplied by the ratio of n045 / n046.

$$\text{Frequency reference} = \text{Memobus register } 0004H \times \frac{n045}{n046}$$

The calculation is updated each time a write to the register is made.

Fig. 2 – Block Diagram of Winder Ratio Frequency Reference

If the Communication/control circuit multi-function input (n050 ~ n056 = 18) is closed and n004 = 10, the winder ratio reference will become active. For other n004 settings the normal Memobus reference will be active.

Memobus Function Code 06H

Support for function code 06H (single register write) is added. The format for the message is shown below.

(Example)

Query Message

Slave address		01H
Function code		06H
Register Address	Upper	00H
	Lower	01H
Setting Data	Upper	00H
	Lower	03H
CRC-16	Upper	98H
	Lower	0BH

Response Message (Normal)

Slave address		01H
Function code		06H
Register Address	Upper	00H
	Lower	01H
Setting Data	Upper	00H
	Lower	03H
CRC-16	Upper	98H
	Lower	0BH

Response Message (Error)

Slave address		01H
80H + Function Code		86H
Error code		21H
CRC-16	Upper	82H
	Lower	78H