YASKAWA

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***CUSTOM SOFTWARE DESCRIPTION***

# TEXTILE FIBER WINDER SOFTWARE

V7 Large HP (5.5 / 7.5 kW)

| | | | |
|---|---|---|---|
| **Software Number:** VSP018080 | | **Base Version:** VSP010103 | |
| **Product:** V7 | | **Part Number:** CIMR-V7AMXXXX-032 | |
| **Release Date:** 2/5/01 | **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 and Dancer Control function are also 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).

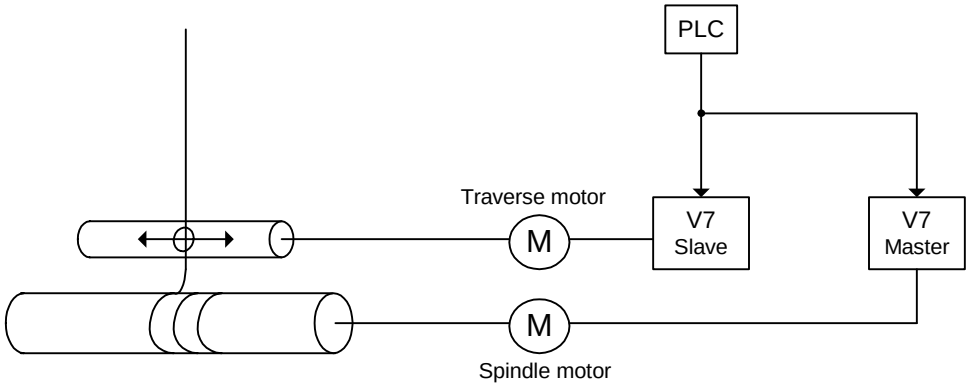
In classical precision winding, the spindle and traverse motors are kept at a constant ratio, usually by mechanical gearing. This ratio is typically on the order of about three decimal places because more common ratios (integer or sub-integer) cause multiple wraps of thread to lay on top of each other, 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.

The “winder ratio” feature of this software is designed to electronically control the 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 | First function | Y |
| n046 | 012EH | Ratio Denominator | - | 1 ~ 9999 | 1 | First function | Y |
| n170 | 01AAH | PID Dancer Setpoint | Hz* | 0.00 ~ 400.0Hz** | 0.00 | Fourth Function | Y |

* Unit depends on the setting of parameter n035 (Display Unit of Frequency Reference).
** For settings greater than 99.99, only one decimal place will be displayed.

Parameters n045 and n046 apply a ratio to the winder frequency reference. By setting n170 to a nonzero value, it becomes the PID setpoint.

**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:**

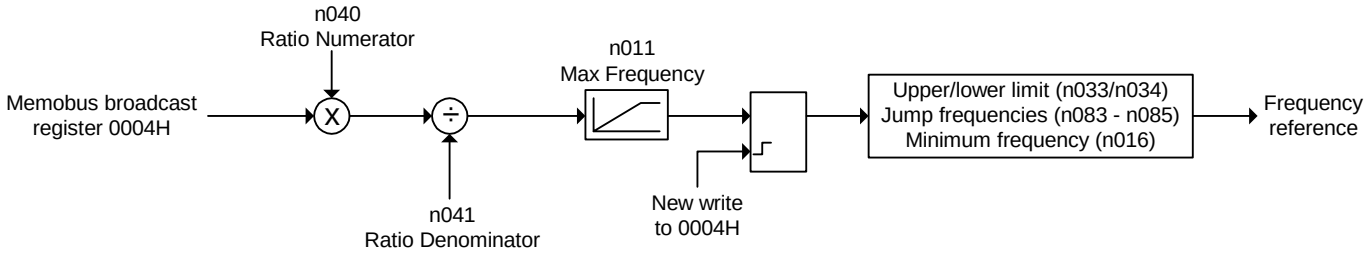
*Ratio Function*

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

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

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 |

*Dancer Control Function*

When the PID Dancer Setpoint n170 = 0.00, the PID function operates as in the standard software. When n170 is set to any other value, it becomes the PID setpoint. In a winding application this feature is used in conjunction with PID Control Selection n128 settings 3, 4, 7, 8 to trim the frequency reference (line speed reference) based on a dancer setpoint and dancer feedback.