JX2-SV1 and CAN-DIMA

Version Update

JX2-SV1, Versions 1.25 to 1.33

CAN-DIMA, Versions 1.20 to 1.28

Jetter

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Overview of Version Updates				
Version	**Function**	**Enhanced**	**Fixed**
JX2-SV1 V1.24 CAN-DIMA V1.18	New technological function "Flying Shear"	✓	
	Registers for the positioning offset for technological functions in master-slave mode: Registers 1x139 and 1x595	✓	
	Register for speed limitation in the "follower control" technological function: Register 1x503	✓	
	Releasing the slave from master-slave operation by means of the positioning command in the technological function "follower control"	✓	
	Overflow problem in the technological function "follower control", table mode		✓
	Overflow problem in the technological function "follower control", if an absolute encoder is used by the master.		✓
	A tracking error has occurred during the reference run		✓
CAN-DIMA V1.19	Technological functions "Position Capture" and "Relative Positioning"; a start input is used with both functions.		✓
JX2-SV1 V1.25 CAN-DIMA V1.20	Technological function "Flying Shear"; immediate cutting.	✓	
JX2-SV1 V1.32 CAN-DIMA V1.27	Technological function "Winding"	✓	
	The position of the spindle on the circumference is displayed		
	Offset of the traversing axis		
	"Jump at the Edge" function		
	Malfunctioning concerning the "Void Increments" function		✓
	The winding gradient during the winding process equals zero		✓
	Technological function "Follower Control", table mode, handling of overflows		✓
	Disable at resolver error (only with CAN-DIMA)		✓

2   New Functions/Features

2.1 New Functions within the "Winding" Category

2.1.1   The position of the spindle on the circumference is displayed

In the winding function, the spindle position, referring to the distance of one winding, can now be read out. In this case, another register is used to define the amount of increments a winding consists of than the register that is used for the actual winding function (register 1x557). The distance covered so far within one spindle rotation can be read out of register 1x591. This way, the spindle position can still be determined, when the actual position has exceeded value range +/-8388607 (as higher set values can be defined by means of the register for the set amount of windings, which is register 1x192).

Register 1x557	Amount of increments for calculating the angle of the spindle position
Function	**Description**
Read Access:	Present parameter value
Write Access:	New value of the parameter
Value Range:	0 .. 32767
Value after Reset:	0

Register 1x591	Distance covered withing a spindle rotation
Function	**Description**
Read Access:	Present parameter value
Write Access:	Illegal
Value Range:	-Reg1x557 .. Reg.1x557 increments (of the spindle)
Value after Reset:	0

If the values of the actual position are positive, the register values will be positive from 0 through the value of register 1x557 (if the values of the actual position are arranged in ascending order, the register values will be counted in ascending order and vice versa)
If the values of the actual position are negative, the register values will be negative from the negative value of register 1x557 through 0 (if the values of the actual position are arranged in ascending order, the register values will be counted in ascending order and vice versa)

Example:
   Register 1x557 = 200
    Register 1x109 = 10050
    Then register 1x591 will be set to 50;
    this means 90° of a spindle rotation (50 / 200 * 360°)

2.1.2   Offset of the traversing axis

The winding function serves for controlling a traversing axis, which feeds a certain kind of material (e.g. wire) over a coil. During this winding process, the traversing axis reverses at the defined edges of the coil as fast as possible. While the material is being applied between the edges, the traversing axis will move forward or backward in proportion to the spindle rotation. The former way of functioning has been explained in the CAN-DIMA manual.

Now, it is possible to have the traversing axis run ahead of the actual winding position at the coil. For some winding material, it will be necessary to position the contact point between winding axis and winding material ahead of the contact point on the spindle; this way, for example, the material can be applied to the coil in "diagonal" mode.
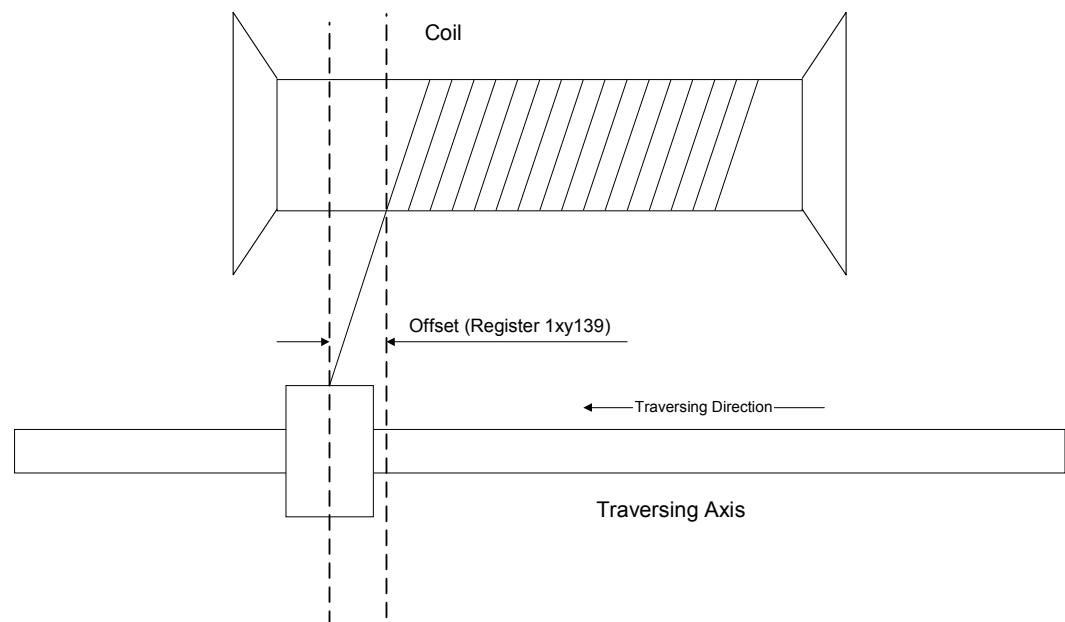
Register 1x139	Offset to the internal set position in the slave	
Function	**Description**
Read Access:	Present parameter value
Write Access:	A new parameter value is defined
Value Range:	0 .. 8388607 increments (of the traversing axis)
Value after Reset:	0

The following aspects must be considered when this register is used:

Other than in the follower control, the value can always be positive only, which means that the traversing axis can only run ahead of the contact point on the winding axis.

The edge of the coil will not be recognized before the winding material has reached the edge. Thus, the offset will not be considered for recognition of the edge. This way, the traversing axis will exceed the edge of the coil, if the offset is greater than zero.

When the edge of the coil has been recognized (reversing of the trasversing axis is started), the offset will also "jump" towards the opposite direction; this will cause the traversing axis to run ahead of the winding material again by the value of register 1x139. As a consequence, the winding axis will run as fast as possible and by maximum acceleration from value (EDGE + OFFSET) to value (EDGE – OFFSET), respectively vice versa at the negative edge.

If void increments are applied at the edge of the coil, the traversing axis will remain on the position where it was when the edge was recognized, until the coil has covered the amount of increments defined in register 1x188 of the traversing axis. Then the offset will be applied (which is twice the value of register 1x139), and the next layer will be fed.

Coil

Traversing direction before recognition of the edge

Traversing direction after recognition of the edge

Traversing Axis

Jump by double the amount of the offset

If void increments are implied, the traversing axis will remain in the left position, until the spindle has covered the void increments, then the jump will be carried out
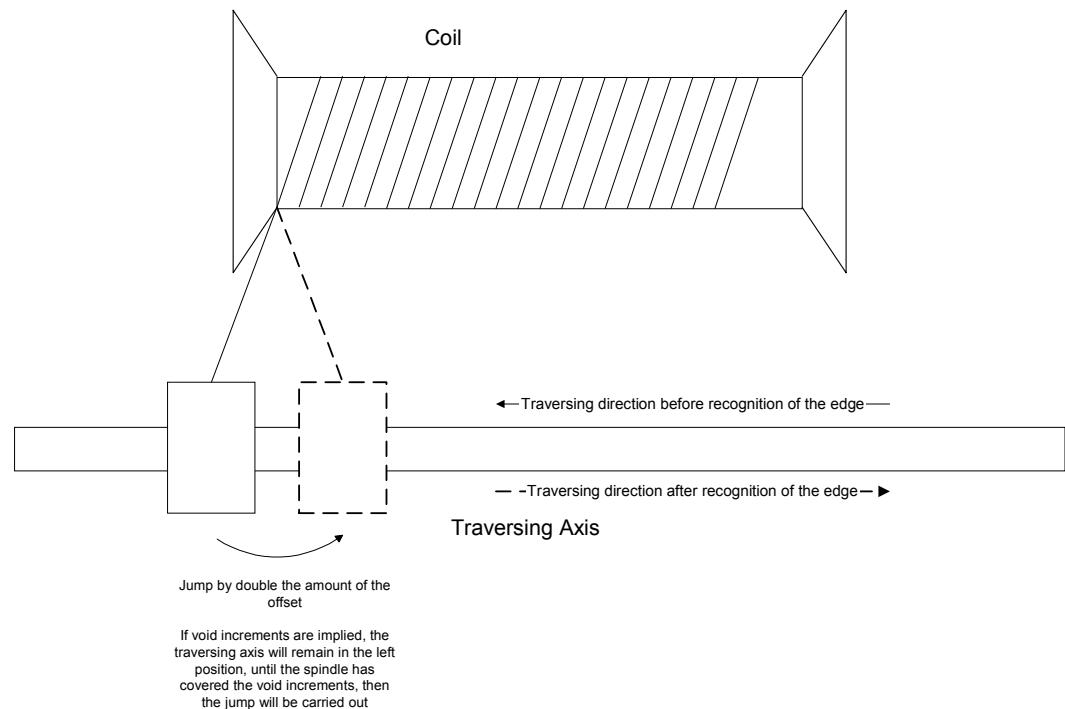
2.1.3   "Jump at the Edge" function

The "Jump at the Edge" function will cause the traverse axis to run to the end and/or the beginning of a layer by maximum speed. This way, the coil ends of certain winding materials can be handled more easily.

There are four new parameters for this function:
Register 1x586 through 1x589

Register 1x586	Jumping distance to the positive edge
Function	**Description**
Read Access:	Present parameter value
Write Access:	New value for the parameter
Value Range:	0 .. 8388607 increments (of the traversing axis)
Value after Reset:	0

If the distance between the traversing axis and the positive edge (register 1x193) amounts to the number of increments defined in register 1x586, it will run to the positive edge by the maximum possible speed (which is limited by the value defined in register 1x103).
The value of register 1x586 defines a distance; thus, it must always be positive.

Register 1x587	Jumping distance to the negative edge
Function	**Description**
Read Access:	Present parameter value
Write Access:	New value for the parameter
Value Range:	0 .. 8388607 increments (of the traversing axis)
Value after Reset:	0

If the distance between the traversing axis and the negative edge (register 1x194) amounts to the number of increments defined in register 1x587, it will run to the negative edge by the maximum possible speed (which is limited by the value defined in register 1x103).
The value of register 1x587 defines a distance; thus, it must always be positive.

Register 1x588	Jumping distance from the positive edge
Function	**Description**
Read Access:	Present parameter value
Write Access:	New value for the parameter
Value Range:	0 .. 8388607 increments (of the traversing axis)
Value after Reset:	0

When the traversing axis has reached the positive edge and possibly waited for the number of void spindle increments (defined in register 1x188) to have passed, it will move away from the axis in winding direction by the maximum possible speed (limited by the value defined in register 1x103) and by the number of increments defined in register 1x588; from there, it will continue winding by the defined winding ratio.
The value of register 1x588 defines a distance; thus, it must always be positive.

Register 1x589	Jumping distance from the negative edge
Function	**Description**
Read Access:	Present parameter value
Write Access:	New value for the parameter
Value Range:	0 .. 8388607 increments (of the traversing axis)
Value after Reset:	0

When the traversing axis has reached the negative edge and possibly waited for the number of void spindle increments (defined in register 1x188) to have passed, it will move away from the axis in winding direction by the maximum possible speed (limited by the value defined in register 1x103) and by the number of increments defined in register 1x589; from there, it will continue winding by the defined winding ratio.
The value of register 1x589 defines a distance; thus, it must always be positive.

Output of the set speed value during the jump
The jump will not be controlled by a set position value generator, which means that a tracking error will be created by the jumping distance. The position feedback control creates a set value signal for the speed control out of the tracking error. This set value signal will be the greater, the greater is the amplification parameter in the position feedback control (register 1x110). Yet, the set speed value will be limited by the value of register 1x103 (as basically at every position during winding).

Interaction with the "Void Increments" parameter
If the "Jump at the Edge" function is applied for both directions at one edge, it will only be useful in connection with the delay function by means of void increments at the edge of the coil. In this case, a jump will be made to the edge of the coil; after a certain delay, a jump back into the normal winding routine will be made. The time that is needed for the jump to the edge, will be added to the delay time (which is defined by the void increments in connection with the resolution and the speed of the spindle).

Interaction with the offset during the winding process
If the offset is also applied to the traversing axis, the offset will be added to the jump to the edge; this means that the jump will be made at the following distance of the traversing axis from the edge: Jumping distance minus offset. Yet, the traversing axis will still exceed the edge by the value of the offset.
When a jump away from the edge is to be made, the offset must be added to the jump twice, because at a change of direction at the edge, the offset must be created for the other direction (please refer to Chapter 2.1.2).

Example

In the table below, the functioning principle will be illustrated once more:
All functions that are of any importance for processing the edge will be considered there.
When the respective parameters have been set to zero, their functions will be cleared from the table.

In this example, every layer of an uneven number will be wound by a larger traversing width than the layer of an even number.

Positive edge (1x193)	=	14000
Negative edge (1x194)	=	2000
Offset (1x139)	=	500
Void increments (1x188)	=	5000
Jumping distance to the positive edge (1x586)	=	1000
Jumping distance to the negative edge (1x587)	=	2000
Jumping distance from the positive edge (1x588)	=	1500
Jumping distance from the negative edge (1x589)	=	2000
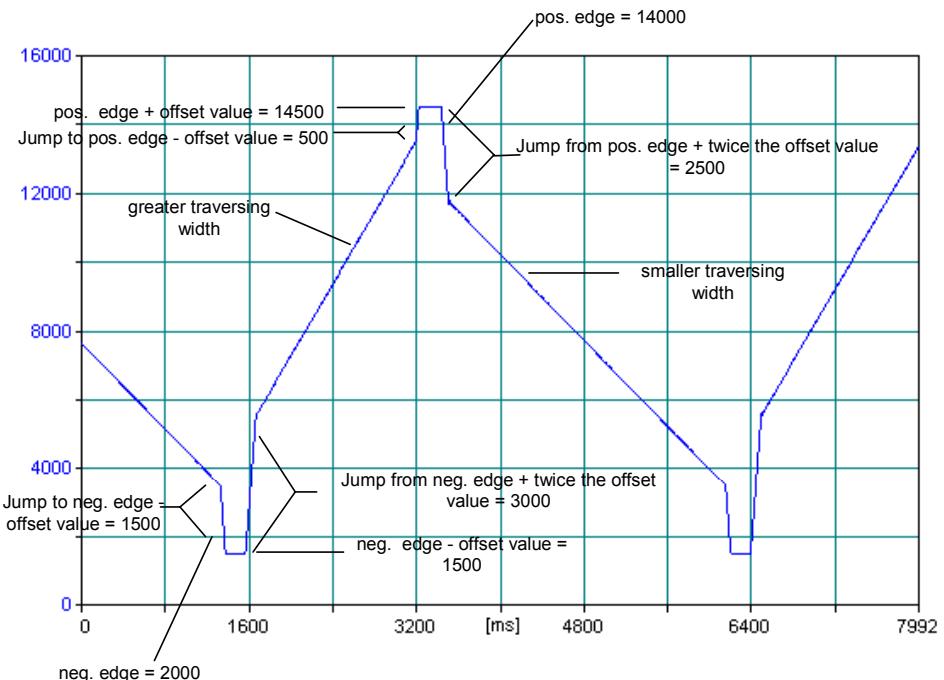
One can realize by this illustration, that after a jump from the edge, the axis will, in the beginning, still be running by a greater speed than would correspond to the traversing width. The reason is the limited speed during the jump. At this point, the tracking error having been caused by the jump, will be decreased. This will be done by the speed defined in register 1x103. If the register value were incremented at that point, the steepness of the jump would be greater, while the time needed for going back to default traversing would be shorter. Yet, the traversing axis would become more prone to oscillating.
For this reason, please be careful to adjust the width and speed of the jump to the possibilities of the respective mechanical plant.

Acceleration limitation of the traversing axis

In order to make the jump at the edges less abrupt during the winding process, the limitation of acceleration can be applied. This will be parameterized via register 1xy060.

Register 1x160	Limitation of acceleration in the winding mode
Function	**Description**
Read Access:	Present parameter value
Write Access:	A new parameter value is defined
Value Range:	0 .. 32767
Value after Reset:	32767 (no limitation)

This limitation functions as follows:

In each position control cycle (approximately 1 ms) the set speed output last will be compared with the newly calculated set speed. If the difference between the former and the new value is greater than the value of register 1x160, the new set speed will be limited to the value "former set speed ± reg. 1x160".
Value 0 .. 32767 for the maximum change of speed relates to the maximum speed defined in register 1x118 (for SV1, the same, ± 10 V applies).
As a limitation always implies an intervention into a control circle, limitations must be handled carefully. Limitations can, for example, lead to unwanted oscillating. (The best values can be determined by trial in the most cases.)

3   Fixed Software Bugs

3.1 Overflow in the Follower Control Via Table

If in the follower control via table the table had been processed in endless mode, it was possible that increments related to the master got lost during resetting the positions at overflow; this caused the master-slave assignment after table overflow not to be the same as before the overflow any more.
Besides that, a small jerk could be caused in the speed control due to incorrect calculation in the speed pre-control.

In order to calculate the overflow correctly, a new register has been introduced now:

Register 1x138 Reset value of the slave	
Function	**Description**
Read Access:	Up-to-date reset value of the slave in the follower control via table
Write Access:	New reset value of the slave in the follower control via table
Value Range:	-8388608 ... 8388607
Value after Reset:	0

If in register 1x138 a value other than zero has been defined, the slave position will be reset by this value, if, after overflow, the table of the follower control is being processed from the beginning. (If zero remains in this register, resetting will be carried out as before. In this case, the slave will be reset by the difference of the values in the first and in the last table element.)

3.2 Technological Function "Winding"

3.2.1   Malfunctioning concerning the "Void Increments" function

While the axis came to a standstill at the edge when the technological function "winding" had been activated – it waited for the void increments defined in register 1x188 – the tracking error was unequal zero, which lead the actual position of the traverse axis to differ from the edge position.

If the value defined in register 1x188 was described to be different from zero once, and then was reset to zero again, the traversing axis positioned at the edge would make a "jump" exceeding the edge by about the same amount as the value being different from zero, which had been assigned to register 1x188 before.

If the spindle was being driven by high speed and the "Void Increments" function was used, the traversing axis would not cover the correct number of increments in one layer any more. As an evidence, the traversing axis would not have the correct position at the end of the winding process.

3.2.2   The winding gradient during the winding process equals zero

If, during the winding process, the winding gradient had been set to zero (register 1x156 = 0), which causes the traversing axis to stand still, and if after this a value unequal zero was written into this register again, the traversing would occasionally start off into a direction opposite to the direction into which it had been driving before zero was written into register 1x156.

3.3 Disable at Resolver Error (With CAN-DIMA Only)

Other than in previous versions, starting from version 1.14 of the CAN-DIMA module, enable would be deactivated when a resolver error occured. Now, the reaction to errors is the same as in the versions older than version 1.14. The error will only be displayed in the status register.