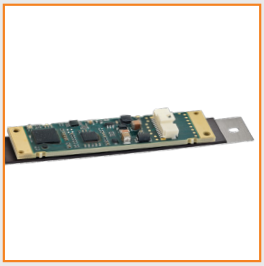
Artos
BiSS C Register Access

The BiSS C interface implemented in Artos supports bidirectional communication in register access mode. The readhead is user configurable. Implementation is compliant with BiSS C (also Standard Encoder Profile known as “BP3”), which is used to group linear and rotary encoders. Details on BiSS register access and BP3 can be found on the **BiSS website**.

User implementation: Users can implement bidirectional BiSS in their own hardware according to the BiSS documentation provided by iC-Haus. As an alternative it is also possible to use the iC-Haus chip iC-MB4, which translates the high-level commands on the SPI bus into BiSS. The easiest way is to use the interface E201-9B from RLS including the corresponding software.

Related products

Artos **DHR** and **DBR** rotary absolute magnetic encoder systems



Artos **DHL** and **DBL** linear absolute magnetic encoder systems

FlexAB absolute magnetic scale system for large diameters

E201-9B USB interface

Memory layout – register banks

BiSS EDS banks

Bank	Address	Symbol	Description	Data type	Unit	Value
1	0x00	EDS_VER	EDS version	U8	-	1
	0x01	EDS_LEN	EDS length	U8	Banks	2
	0x02	USR_STA	Bank address USER start	U8	-	255
	0x03	USR_END	Bank address USER end	U8	-	1
	0x04	TMA	Min. permited clock periond	U8	1 ns	200
	0x05	TO_MIN	Min. BiSS timeout	U8	250 ns	60
	0x06	TO_MAX	Max. BiSS timeout	U8	250 ns	64
	0x07	TOS_MIN	Min. BiSS timeout_S	U8	25 ns	0
	0x08	TOS_MAX	Max. BiSS timeout_S	U8	25 ns	0
	0x09	TCLK_MIN	Min. sampling period adaptive timeout	U8	25 ns	0
	0x0A	TCLK_MAX	Max. sampling period adaptive timeout	U8	25 ns	0
	0x0B	TCYC	Min. cycle time	U8	250 ns	**table A**
	0x0C	TBUSY_S	Max. Processing time SCD	U8	250 ns	0
	0x0D	BUSY_S	Max. Processing time SCD in clocks	U8	TMA	15
	0x0E – 0x0F	PON_DLY	Max. “power on delay” until control communication is available	U16	1 ms	200
	0x10	DC_NUM	Number of channels in this device	U8	-	1
	0x11	SL_NUM	Area of validity for this EDS (number of slave addresses)	U8	-	1
	0x12	SL_OFF	Memory location for this EDS (slave ID within this device)	U8	-	0
	0x13	-	Reserved	U8	-	0
	0x14	BANK1	Bank address for content description of data channel 1 (Profile EDS)	U8	-	0
	0x15	DLEN1	Data length for data channel 1	U8	Bit	**table A**
	0x16	FORMAT1	Data format for data channel 1	U8	Bit	2
	0x17	CPOLY1	CRC polynomial (8:1) for data channel 1	U8	-	0x21
	0x18 – 0x33	-	Reserved	U8	-	0
	0x34	BC_OFF	Bus coupler control location for this device (slave ID within this device)	U8	-	0
	0x35 – 0x3E	-	Reserved	U8	-	/
	0x3F	CHKSUM	Checksum (sum of all bytes within this bank)	U8	-	xx

Bank	Address	Symbol	Description	Data type	Unit	Value
0	0x00	BP_VER	BiSS profile 3 version	U8	-	1
	0x01	BP_LEN	Length of this profile	U8	Banks	1
	0x02 – 0x03	BP_ID	Profile identification BP3 (content also available in addresses 0x42 and 0x43)	U16	-	**table B**
	0x04	PROFILE_FB1	Feedback bit 1 (nError = 1)	U8	-	1
	0x05	PROFILE_FB2	Feedback bit 2 (nWarning = 2)	U8	-	2
	0x06	PROFILE_PON_PDL	Max. “power on delay” until position data is available	U8	ms	200
	0x07	-	Reserved	U8	-	0
	0x08	PROFILE_EN_TYP	Encoder type (rotary = 0, linear = 1)	U8	-	**table C**
	0x09	PROFILE_POS_NUM	Position value (1 position)	U8	-	1
	0x0A	PROFILE_MT_LEN	Data length MULTITURN	U8	Bit	0
	0x0B	PROFILE_MT_FMT	Data format MULTITURN	U8	-	0
	0x0C	PROFILE_CO_LEN	Data length COARSE	U8	Bit	0
	0x0D	PROFILE_CO_FMT	Data format COARSE	U8	-	0
	0x0E	PROFILE_FI_LEN	Data length FINE	U8	Bit	**table B**
	0x0F	PROFILE_FI_FMT	Data format FINE	U8	-	0
	0x10 – 0x13	PROFILE_MT_CNT	Number of distinguishable revolutions	U32	Count	0
	0x14 – 0x17	PROFILE_SIP_CNT	Number of signal periods per revolution/ length of signal period	U32	PPR (rotary) nm (linear)	**table C**
	0x18 – 0x1B	PROFILE_SIP_RES	Resolution factor per signal period (LSB of interpolation)	U32	Count	**table B**
	0x1C – 0x1F	PROFILE_CPOLY	CRC polynomial (32:1 of 0x43)	U32	-	0x21
	0x20 – 0x23	PROFILE_CSTART	CRC start value	U32	-	0
	0x24 – 0x25	PROFILE_ABS_ACU	Absolute accuracy	U16	LSB/2 (rotary) µm (linear)	**table D**
	0x26 – 0x27	PROFILE_REL_ACU	Relative accuracy	U16	LSB/2	**table D**
	0x28 – 0x29	PROFILE_SPD_ACU	Angular speed/speed depending accuracy	U16	LSB/2	1*
	0x2A – 0x2B	PROFILE_HYST	Hysteresis	U16	LSB/2	**table D**
	0x2C – 0x2D	PROFILE_SPD_MAX	Max. revolution speed/max. speed	U16	1/min m/min	**
	0x2E – 0x2F	PROFILE_ACC_MAX	Max. revolution acceleration/max. acceleration	U16	$1/min^2$ m/min^2	65534*
	0x30 – 0x31	PROFILE_TMP_MIN	Min. operating temperature	U16	K	233
	0x32 – 0x33	PROFILE_TMP_MAX	Max. operating temperature	U16	K	358
	0x34 – 0x35	PROFILE_VLT_MIN	Min. operating voltage	U16	mV	4750
	0x36 – 0x37	PROFILE_VLT_MAX	Max. operating voltage	U16	mV	30000
	0x38 – 0x39	PROFILE_CUR_MAX	Max. current consumption	U16	mA	160
	0x3A – 0x3E	-	Reserved	U8	-	/
	0x3F	CHKSUM	Checksum (sum of all bytes within this bank)	U8	-	xx

All parameters from EDS banks are read-only.

* Actual value not measured.

** Parameter value depends on actual part number.

Encoder identification bank

Bank	Address	Data type	Access	Default value	Description
2	0x00 – 0x06	6xU8	R	*	RLS serial number (ASCII characters)
	0x07 – 0x13	U8	R	-	Reserved
	0x14 – 0x27	20xU8	R	*	RLS part number (ASCII characters)
	0x28 – 0x29	U16	R	4	FW major version
	0x2A – 0x2B	U16	R	*	FW minor version
	0x2C – 0x2D	U16	R	*	FW hotfix version
	0x2E – 0x31	U32	R	*	FW build version
	0x32 – 0x35	4xU8	R	*	FW version short hash
	0x36 – 0x3E	U8	R	-	Reserved
	0x3F	U8	R	xx	Checksum (sum of all bytes within this bank)

* Most values of parameters in identification bank depend on actual part number.

Encoder configuration bank

Bank	Address	Data type	Access	Value in effect	Default value	Min / max	Description
3	0x00 – 0x03	U32	RW	Immediate	0	Rotary: 0...SIP_RES Linear: $0...2^{FI_LEN}$	Position offset
	0x04 – 0x0B	U8	R	-	/	-	Reserved
	0x0C – 0x0F	U32	RW	Power-on	190	0...240	Velocity filter value
	0x10 – 0x18	U8	R	-	/	-	Reserved
	0x19	U8	RW	Power-on	0	0...1	Counting direction change
	0x1A	S8	RW	Immediate	115	–127...127	LED turn off temp.*
	0x1B	S8	RW	Immediate	110	–127...127	LED turn on temp.*
	0x1C – 0x3D	U8	R	-	/	-	Reserved
	0x3E	U8	RW	After “c” command	0x5A	0...255	Write protect lock
	0x3F	U8	R	-	xx	0...255	Checksum (sum of all bytes within this bank)

* The LED is switched on by default. If the temperature rises to “LED turn off temp.”, the LED is switched off. As soon as the temperature falls below the “LED turn on temp.”, it is switched on again. If “LED turn off temp” and “LED turn on temp” are set to –127, LED is turned off.

Self-calibration bank

Bank	Address	Data type	Access	Default value	Min / max	Description
4	0x00 – 0x03	U32	R	0	-	Self-calibration status
	0x04 – 0x05	U8	R	0	-	Reserved
	0x06 – 0x07	U16	R	0	-	Ring eccentricity shift from rotation axis centre [µm] This parameter is updated only if self-calibration is successful.
	0x08 – 0x09	U16	R	0	-	Ring eccentricity angle (phase) [deg] This parameter is updated only if self-calibration is successful.
	0x0A – 0x0B	S16	R	0	-	Average readhead radial shift (distance to nominal ride height: Actual RH [µm] = nominal RH – radial shift) [µm] This parameter is updated only if self-calibration is successful.
	0x0C	U8	RW	10	1...40	Calibration timeout [s]
	0x0D – 0x3E	U8	R	/	-	Reserved
	0x3F	U8	R	xx	-	Checksum (sum of all bytes within this bank)

Some of writable parameters values are taken into account immediately after value gets changed by writing to this register. For these registers it is not needed to save configuraton to non-volatile memory if setting will only be needed in current power cycle.

Direct access registers

Address	Data Type	Access	Default value	Description
0x40	U8	RW	0	Bank select
0x41	U8	R	1	EDS bank
0x42 – 0x43	U16	R	*	Profile ID (table B – BP_ID)
0x44 – 0x47	U32	R	*	Serial number (encoded)
0x48	U8	RW	255	Key register
0x49	U8	RW	255	Command register
0x4A – 0x4D	U32	R	0	Encoder detailed status (see chapter "**Encoder operating parameters**")
0x4E – 0x4F	S16	R	**	Sensor temperature in °C
0x50 – 0x53	U8	R	0	Reserved
0x54 – 0x57	S32	R	**	Measured velocity in: • 0.1 rpm for rotary encoders (except FlexAB) • 0.01 rpm for FlexAB • mm/s for linear encoders
0x58 – 0x5B	U32	R	0**	Persistent detailed status
0x5C	U8	R	0**	Parameter access status register – see **table E**
0x5D – 0x73	U8	R	-	Reserved
0x74 – 0x77	U32	R	Same as in Identification bank	Major FW version
0x78 – 0x7D	U8	R	*	Device ID
0x7E – 0x7F	U16	R	0x5253	Manufacturer ID

* Parameter value depends on actual part number.
** Parameter value changes during operation.

Table A

Encoder family	Resolution	TCYC	DLEN1
DxR	23B	102	25
	22B	102	24
	21B	101	23
	20B	100	22
	19B	99	21
	18B	98	20
	17B	98	19
	0AB	102	25
	0BB	102	24
	0CB	101	23
	0DB	100	22
	0EB	100	22
	0FB	99	21
	0GB	98	20
	0HB	100	22
	0IB	99	21
	0JB	99	21
	0KB	98	20
	0LB	98	20
	0MB	101	23
DxL / DxF	14U	106	30
	13U	106	29
	12U	105	28
	11U	104	27
	10U	103	26
	09U	102	25
	08U	102	24
	07U	101	23
	06U	100	22
	05U	99	21
	04U	98	20
	4D0	105	28
	8D0	106	29
	001	104	27
	002	103	26
	005	102	25
	010	102	24
	10D	107	31
	20D	106	30

Table B

Encoder family	Resolution	BP_ID	FI_LEN	SIP_RES
DxR	23B	0x6219	23	8388608
	22B	0x6218	22	4194304
	21B	0x6217	21	2097152
	20B	0x6216	20	1048576
	19B	0x6215	19	524288
	18B	0x6214	18	262144
	17B	0x6213	17	131072
	0AB	0x6219	23	5898240
	0BB	0x6218	22	2949120
	0CB	0x6217	21	1474560
	0DB	0x6216	20	1024000
	0EB	0x6216	20	737280
	0FB	0x6215	19	368640
	0GB	0x6214	18	184320
	0HB	0x6216	20	720000
	0IB	0x6215	19	512000
	0JB	0x6215	19	360000
	0KB	0x6214	18	256000
	0LB	0x6214	18	180000
	0MB	0x6217	21	1504000
DxL	14U	0x621E	28	8192
	13U	0x621D	27	4096
	12U	0x621C	26	2048
	11U	0x621B	25	1024
	10U	0x621A	24	512
	09U	0x6219	23	256
	08U	0x6218	22	128
	07U	0x6217	21	64
	06U	0x6216	20	32
	05U	0x6215	19	16
	04U	0x6214	18	8
	4D0	0x621C	26	4000
	8D0	0x621D	27	2000
	001	0x621B	25	1000
	002	0x621A	24	500
	005	0x6219	23	200
	010	0x6218	22	100
	10D	0x621F	29	10000
	20D	0x621E	28	5000

Encoder family	Resolution	BP_ID	FI_LEN	SIP_RES
	14U	0x621E	28	Number of magnetic poles × 16384*
	13U	0x621D	27	Number of magnetic poles × 8192*
	12U	0x621C	26	Number of magnetic poles × 4096*
	11U	0x621B	25	Number of magnetic poles × 2048*
	10U	0x621A	24	Number of magnetic poles × 1024*
	09U	0x6219	23	Number of magnetic poles × 512*
	08U	0x6218	22	Number of magnetic poles × 256*
	07U	0x6217	21	Number of magnetic poles × 128*
	06U	0x6216	20	Number of magnetic poles × 64*
DxF	05U	0x6215	19	Number of magnetic poles × 32*
	04U	0x6214	18	Number of magnetic poles × 16*
	4D0	0x621C	26	Number of magnetic poles × 8000*
	8D0	0x621D	27	Number of magnetic poles × 4000*
	001	0x621B	25	Number of magnetic poles × 2000*
	002	0x621A	24	Number of magnetic poles × 1000*
	005	0x6219	23	Number of magnetic poles × 400*
	010	0x6218	22	Number of magnetic poles × 200*
	10D	0x621F	29	Number of magnetic poles × 20000*
	20D	0x621E	28	Number of magnetic poles × 10000*

* The number of magnetic poles is determined by the FlexAB scale.

Table C

Encoder family	EN_TYP	SIP_CNT
DxR	0	1
DxL	1	1000000
DxF	0	1

Table D

Encoder family	Actuator	Resolution	ABS_ACU	REL_ACU	HYST
DxR	057	20B	408	18	41
		19B	204	9	21
		18B	102	5	11
		17B	51	3	6
		0CB	574	25	57
		0EB	287	13	29
		0FB	144	7	15
		0GB	72	4	8
		0LB	70	3	7
	081	21B	467	25	59
		20B	234	13	30
		19B	117	7	15
		18B	59	4	8
		0KB	57	3	8
	114	21B	350	18	43
		20B	175	9	22
		19B	88	5	11
		18B	44	3	6
		0BB	492	25	60
		0CB	246	13	30
		0EB	123	7	15
		0FB	62	4	8
		0JB	60	3	8
	162	22B	583	25	59
		21B	292	13	30
		20B	146	7	15
		19B	73	4	8
		0IB	72	3	8
	229	22B	467	18	39
		21B	234	9	20
		20B	117	5	10
		19B	59	3	5
		0AB	656	25	55
		0BB	328	13	28
		0CB	164	7	14
		0EB	82	4	7
		0HB	80	3	7
	325	23B	700	25	52
		22B	350	13	26
		21B	175	7	13
		20B	88	4	7
		0DB	86	3	7

Encoder family	Actuator	Resolution	ABS_ACU	REL_ACU	HYST
DxR	478	23B	700	17	40
		22B	350	9	20
		21B	175	5	10
		20B	88	3	5
		0MB	126	3	8
DxL	001	Any	10	$\text{Ceil}\left(\frac{3}{\text{resolution in µm}}\right)$	$\text{Ceil}\left(\frac{6}{\text{resolution in µm}}\right)$
	002	Any	10		
	003	Any	15		
	004	Any	6		
DxF	Any	Any	$\text{Ceil}\left(\frac{50 \times \text{CPR} \times 2}{\text{scale length [µm]}^*}\right)$	$\text{Ceil}\left(\frac{3 \times \text{CPR}}{\text{scale length [µm]}^*}\right)$	$\text{Ceil}\left(\frac{6 \times \text{CPR}}{\text{scale length [µm]}^*}\right)$

* scale length [µm] = 2000 × Number of magnetic poles

Table E (Parameter access status register)

Bit	Description
0	Write access denied
1	Value out of range
2 – 5	Reserved
6	Command fetched and executed
7	Write lock active

Bits are persistent - they get cleared on register read, except “Write lock active”, which can not be cleared.

Bank switching

BiSS registers are grouped into the banks in size of 64 bytes. Each register in each bank can be accessed with the address from 0x00 to 0x3F. Before access to a certain bank, it has to be selected in the Bank select register, which is mapped to address 0x40. For further information on bank switching refer to documentation provided by iC-Haus.

Read access

All registers in Artos memory are readable. Read access also supports sequential reading. It is possible to read up to 64 bytes forward from initialized read address. For detailed description on sequential read access refer to documentation provided by iC-Haus.

Write access

Writable registers in Artos memory are presented in chapter **Memory layout**. All registers can be write-protected if write access is locked by the user, except of Bank select register. Sequential write access is available in all banks. For detailed description on sequential write access refer to documentation provided by iC-Haus.

Encoder operating parameters

Address	Data Type	Access	Description
0x4A – 0x4D	U32	R	Encoder status
0x58 – 0x5B	U32	R	Persistent encoder status
0x4E – 0x4F	S16	R	Sensor temperature in °C
0x54 – 0x57	S32	R	Rotational speed
0x00 – 0x03	U32	R	Self-calibration status (bank 4)

Encoder status

Detailed status bits represent current operational state of the encoder. For more information refer to DRD01 in “BiSS C Communication interface” chapter at **RLS Media center**.

Persistent encoder status

This is similar to “Encoder status”, but with the added functionality that all detailed statuses are accumulated. Any error or warning that appears in Detailed Status during operation of encoder is copied into Persistent detailed status. Even if the value in Detailed Status has very short duration, the past statuses can be read from this Persistent register. It keeps the value as long as the power is present. Clearing is possible either by a power cycle or by writing the command ‘b’ to the Command register.

Sensor temperature

Temperature of the sensor in °C. This value is typically 10 °C to 15 °C higher than ambient. Tolerance of the readout is ±5 °C. Temperature is updated every ~2 seconds and it is valid ~2 seconds after startup.

Measured speed

Encoder rotational speed is measured in 0.1 rpm for solid rings, 0.01 rpm for FlexAB and mm/s for linear and partial arc encoders.

Self-calibration status

See chapter **Self-calibration.**

Artos programming

Position offset (encoder zero position) and register write protection can be programmed to the Artos readhead. Additional to this, the readhead can be self-calibrated or reset to the factory defaults. Values written into registers take effect immediately, with some exceptions - see “value in effect” column in registers description tables.

Command execution

To execute a command use the following sequence:
Write value 0xCD to Key register at address 0x48.
Write command byte to Command register at address 0x49.

Write to the key and command register must be sequential. No other register access should take place in between, otherwise command will not be executed. Any other register access after the correct key is entered, invalidates the key value and the command write procedure has to be repeated.

After each command is fetched by encoder, communication is disabled during command execution.
Communication is enabled only after command has executed which can last up to 100 ms.
During this time encoder will not respond to communication requests.

Master can check if command was executed in “Parameter access status register” – see **table E**.

Supported commands

Command	Command [hex]	Typ. execution time [ms]	Description
'A'	0x41	Set with parameter	Self-calibration start
'b'	0x62	1	Persistent detailed status reset
'c'	0x63	70	Save current configuration to non-volatile memory
'r'	0x72	70	Configuration reset to factory defaults

Position offset (encoder zero position)

Position offset value is substracted from the raw encoder position. Position offset is mapped to the registers 0x00 - 0x03 of bank 3 in a big-endian format. User must write separate bytes of a new position offset in counts to these addresses. Afterwards, they can be read to verify the proper write operation. If the absolute applied position offset is greater than the actual encoder resolution, value will not get updated.

Position offset will be applied only on absolute communicational channel. Position offset does not have impact on ABZ.

In case of position counting direction change, position offset has to be updated (write position offset 0, read current position and write it to position offset).

To store new value into non-volatile memory use the following sequence:
KEY: write value 0xCD to address 0x48.
Command for saving programmed data to a non-volatile memory: write value 0x63 to address 0x49.

Saving the parameters in the non-volatile memory takes 70 ms. During this time, the encoder position is not calculated.

Self-calibration

Self-calibration of Artos is suitable after mounting the readhead and ring. It improves the accuracy of the encoder, which depends on the mounting precision. It can be triggered by sending the KEY (0xCD) to the Key register (address 0x48) and afterwards sending the Self-calibration start command (0x41) to the Command register (address 0x49). No communication via the BiSS interface is possible during the process; the encoder does not respond to incoming clock cycles. The completion of the process is indicated by the LED flashing rapidly for 3 seconds. If the self-calibration was successful, the LED flashes green, otherwise it flashes red. The BiSS interface is then active again. The status of self-calibration can be read from a register 0x00 in bank 4. It consists of a two-bit counter. The counter is incremented at the end of each self-calibration. Status bits indicate success or reasons for failure.

> The self-calibration function is only available on the DHR and DBR readheads (rotary Artos readheads) for the eccentricity correction. DHL and DBL linear readheads do not support the self-calibration function – the self-calibration command will be ignored.

Prior to the self-calibration process, the status should be read from register 0x00 - 0x03 in bank 4. The controller must remember the current self-calibration counter (bits 1:0). After sending the self-calibration command, LED must be observed for completion. If the LED is not visible, the readhead should be polled via the BiSS interface until communication with the readhead is re-established, or wait 10 seconds, which is the default timeout for completion. The self-calibration status register should then be read out again. When the self-calibration counter has increased by 1 (compared to the previously read value), the self-calibration function has been completed. Additional data from the self-calibration is available in bank 4 and includes the measurement of the ring eccentricity and the placement of the readhead.

Speed and direction of rotation during self-calibration are not important and may be inconsistent. The only requirement is that the shaft makes at least one complete revolution within 10 seconds of the command being sent. If the default setting of 10 seconds is not sufficient, this period can be extended to up to 40 seconds using register 0x0C, bank 4.

Address	Type	Range	Units	Meaning / usage
INPUT				
0x0C, bank 4	U8	1 – 40	s	Calibration timeout
0x48	U8	0xCD	-	Key
0x49	U8	0x41	-	Command
OUTPUT, bank 4				
0x06 – 0x07	U16	-	µm	Ring eccentricity shift from rotation axis centre
0x08 – 0x09	U16	0 – 360	degrees	Ring eccentricity angle (phase)
0x0A – 0x0B	S16	-	µm	Average readhead radial shift (distance to nominal ride height: Actual RH [µm] = nominal RH – radial shift) [µm]
0x00 – 0x03	U32	-	bit	Status - see table below

Self-calibration status register

Bit	Meaning
b21	Error – Parameters could not be saved to non-volatile memory (system fault).
b20	Indication – Error map table is not default (self-calibration was successfully performed). Comparison is executed at power-up and at every command “Save current configuration to non-volatile memory”.
b19	Reserved
b18	Reserved
b17	Reserved
b16	Reserved
b15	Reserved
b14	Indication – Eccentricity is already low (no correction is needed).
b13	Error – Eccentricity is very high.
b12	Error – Numerical error during data processing.
b11	Reserved
b10	Reserved
b9	Error – Encoder is in error state while calibration is started - aborted.
b8	Timeout – Encoder did not complete full revolution (or partial arc) in preset time.
b7	Reserved
b6	Error
b5	Ring positioning is already perfect – correction was not performed.
b4	Confirmation – Self calibration successfully completed.
b3	Reserved
b2	Reserved
b1:b0	Counter is incremented at the end of self-calibration procedure.

When self-calibration is completed without error, the new parameters are automatically stored in non-volatile memory and no further command is required. All numeric results from the calibration are stored in the volatile memory and are cleared on the power cycle. To verify if encoder was already calibrated, read the Self-calibration status register and verify that bit b6 (0x40) is set.

Velocity filter

Internally calculated velocity (rotational speed) is passed through the low-pass filter. This gives smoother position value on communication interface. Increased Value parameter increases filter strength and reduces cut-off frequency. Filter is constant and not dependent on the rotational speed.

Address	Name	Default	Range	Description
0x0C – 0x0F	Velocity filter value	190	0 – 240	Value of Velocity Filter. 0 = filter disabled

Filter settings

Settings are present in bank 3 - Encoder configuration bank.

Changing filter values may cause encoder or closed control loop to become unstable. Use with caution and evaluate all possible situations before keeping the new values.

Saving configuration parameters

Sending a programming command byte 'c' triggers the procedure to save all configuration parameters of the encoder in the non-volatile memory. These parameters also include the position offset.

KEY: write value 0xCD to address 0x48.
Command for saving programmed data to a non-volatile memory: write value 0x63 to address 0x49.

Saving the parameters in the non-volatile memory takes 70 ms. During this time, the encoder position is not calculated.

Reset to factory defaults

Resetting to the factory defaults will set all programmed parameters to the default values. This includes the zero position, the calibration results and others.

KEY: write value 0xCD to address 0x48.
Command for saving programmed data to a non-volatile memory: write value 0x72 to address 0x49.

Saving the parameters in the non-volatile memory takes 70 ms. During this time, the encoder position is not calculated.

After locking the write access, the encoder cannot be reset to the factory defaults.

Write protection

Write protection can be used to lock the write access of any writable register in Artos memory map, except of Bank select register. It is mapped to the register 0x3E of bank 3. Its default value is 0x5A. To lock the write access, user should write any value other than 0x5A. After that, the write access of any register, except of Bank select, will be refused.
All registers will behave as a non writable registers.

KEY: write value 0xCD to address 0x48.
Command for saving programmed data to a non-volatile memory: write value 0x63 to address 0x49.

Saving the parameters in the non-volatile memory takes 70 ms. During this time, the encoder position is not calculated.

After locking the write access, the readhead cannot be programmed anymore. All registers are still readable.

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Document issues

Issue	Date	Page	Description
1	4. 11. 2025	-	New application note
2	5. 8. 2026	14	Self-calibration chapter amended
		-	Updated document design

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