AKD™

Parameter and Command Reference Guide

Edition December 2009

Valid for Hardware Revision A

Original Document

Patents Pending

Keep all manuals as a product component
during the life span of the product.
Pass all manuals to future users/owners
of the product.

Record of Document Revisions:

Revision	Remarks
12/2009	Launch version

Hardware Revision (HR)

Hardware Revision	Firmware	WorkBench	Remarks
A	M_01-01-00-000	1.1.0.11368	Launch

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Current patents:

US Patent 5,646,496 (used in control card R/D and 1 Vp-p feedback interface)

US Patent 5,162,798 (used in control card R/D)

US Patent 6,118,241 (used in control card simple dynamic braking)

Technical changes which improve the performance of the device may be made without prior notice!

Table of Revisions

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1 About the Parameter and Command Reference Guide

This reference guide provides descriptive information about each parameter and command used in the AKD firmware. Parameters and commands are used to configure the drive or to return status information from the drive via the WorkBench terminal screen. The use of parameters and commands to perform various drive functions is detailed in Section [link] of the AKD User Guide.

For each parameter or command, this guide presents the following table of information, followed by a description of the command and examples as appropriate.

XXX.XXX (Parameter or Command Name)

General Information	
Type	One of four types: • Command: Action or W/O command. • NV Parameter: R/W and stored in nonvolatile (NV) memory • R/W Parameter: Can be either read from or written to the drive. • R/O Parameter. Can only be read from the drive
Description	Brief description of the parameter or command.
Units	Appropriate units (see Table of Units [link] unit descriptions)
Range	Permissible range; multiple ranges are sometimes present.
Default Value	Determined at setup process time or motor ID; otherwise set to 0.010.
Data Type	Integer, Boolean, Float, or String
See Also	Links to related information such as other parameters, block diagrams, schematics, or other sections of the product manual.
Start Version	The minimum firmware version number required to use the parameter or command

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	1 four-digit hex number/1 two-digit hex number.
Data Type	See DS301 list.
PDO Mappable	Yes or no.
Start Version	The minimum firmware version number required to use the parameter or command.

Additional data types may include:

Type	Description
Error	Illegal type=0
b	Boolean
U8	8 x unsigned numbers

Type	Description
S8	8 x signed numbers
U16	16 x unsigned numbers
S16	16 x signed numbers
U32	32 x unsigned numbers
S32	32 x signed numbers
U64	64 x unsigned numbers
S64	64 x signed numbers

1.1 Parameter and Command Naming Conventions

Abbreviation	Term
ACC	Acceleration
APP	Apply
CLR	Clear
CS	Controlled Stop
I	Current
D	Current D component
DEC	Deceleration
DIR	Direction
DIS	Disable
DIST	Distance
EMUE	Emulated encoder
EN	Enable
ERR	Error
F	Fault
FB	Feedback
FF	Feedforward
K	Gain
INT	Integrator
LIM	Limit
L	Loop
MAX	Maximum
MIN	Minimum
N	Negative
NV	Nonvolatile
P	Position,Proportional, Positive
RLS	Release
R	Resistance
STATE	Status, State, Stat
THRESH	Threshold
T	Time
TMAX	Timeout
U	User
V	Velocity, Volt
W	Warning

1.2 Summary of Parameters and Commands

This table lists all valid commands and parameters, with a brief description for each. The parameter name and description are linked to the parameter tables.

Parameter or Command	Type	Description
Analog Input (AIN)		

Parameter or Command	Type	Description
AIN.CUTOFF	NV	Sets the analog input low-pass filter cutoff frequency.
AIN.DEADBAND	NV	Sets the analog input signal deadband.
AIN.OFFSET	NV	Sets the analog input offset.
AIN.VALUE	R/O	Reads the value of the analog input signal.
AIN.ZERO	Command	Zeroes the analog input signal.
Analog Current Output (AIO)		
AIO.ISCALE	NV	Sets current scale factor.
AIO.VSCALE	NV	Sets velocity scale factor.
"AIO.PSCALE" (page 22)	NV	Sets position scale factor.
Analog Output (AOUT)		
AOUT.MODE	NV	Sets the analog output mode.
"AOUT.OFFSET" (page 27)	NV	"Sets the analog input offset." (page 27)
AOUT.VALUE	NV	Reads the analog output value.
"AOUT.VALUEU" (page 29)	R/W	Sets the analog output value.
Bode plot (BODE)		
BODE.EXCITEGAP	R/W	Controls how often the excitation is updated.
BODE.FREQ	R/W	Sets the frequency of the sine excitation source.
BODE.IAMP	R/W	Sets current command value used during the Bode procedure.
BODE.INJECTPOINT	R/W	Sets whether the excitation uses current or velocity excitation type.
BODE.MODE	R/W	Sets the mode of the excitation.
BODE.PRBDEPTH	R/W	Sets the length of the PRB signal before it repeats.
BODE.VAMP	R/W	Sets the amplitude of the excitation when in velocity mode.
Capture (CAP)		
CAP0.EN, CAP1.EN	R/W	" Enables or disables the related capture engine." (page 41)
CAP0.FILTER, CAP1.FILTER	R/W	"Controls the precondition logic." (page 42)
CAP0.MODE, CAP1.MODE	NV	Selects the captured value.
CAP0.PLFB, CAP1.PLFB	R/O	Sets captured position value.
CAP0.PREFILTER, CAP1.PREFILTER	R/W	Sets the filter for the precondition input source.
CAP0.PRESELECT, CAP1.PRESELECT	R/W	Sets the precondition trigger.
CAP0.STATE, CAP1.STATE	R/O	Indicates whether or not trigger source was captured.
CAP0.T, CAP1.T	R/O	Reads time capture (if time capture was configured).
CAP0.TRIGGER, CAP1.TRIGGER	R/W	Specifies the trigger source for the position capture.
Controlled Stop (CS)		

Parameter or Command	Type	Description
CS.DEC	NV	Sets the deceleration value for the controlled stop process.
CS.STATE	NV	Returns the internal status of the controlled stop process.
CS.TMAX	R/O	Sets the time-out value for the drive to disable if velocity is not within CS.VTHRESH.
CS.TO	NV	Sets the time value for the drive velocity to be within CS.VTHRESH.
CS.VTHRESH	NV	Sets the velocity threshold for the controlled stop.
Digital Input (DIN)		
DIN.DIPSWITCH	R/O	Reads the DIP switch positions.
DIN.ROTARY	R/O	Reads the rotary knob value.
DIN.STATES	R/O	Reads the digital input states.
DIN1.INV TO DIN7.INV	R/W	Sets the indicated the polarity of a digital input mode.
DIN1.MODE TO DIN7.MODE	NV	Sets the digital input modes.
DIN1.PARAM TO DIN7.PARAM	R/W	Sets a value used as an extra parameter for digital inputs nodes.
DIN1.STATE to DIN7.STATE	R/O	Reads a specific digital input state.
Digital Output (DOUT)		
DOUT.CTRL	NV	Sets the source of digital outputs (firmware or fieldbus).
DOUT.RELAYMODE	R/W	Indicates faults relay mode.
DOUT.STATES	R/O	Reads the state of the two digital outputs.
DOUTx.MODE	NV	Sets the digital output mode.
DOUT1.PARAM AND DOUT2.PARAM	NV	Sets extra parameters for the digital outputs.
DOUT1.STATE AND DOUT2.STATE	R/O	Reads the digital output state.
Drive (DRV)		
DRV.ACC	NV	Describes the acceleration ramp for the velocity central loop.
DRV.ACTIVE	R/O	Reads the enable status of an axis.
DRV.BLINKDISPLAY	Command	Causes the display to blink for 10 seconds.
DRV.BURNINOFFT (Password Protected)	R/W	Sets the burn-in test mode OFF time.
DRV.CLRFAULTHIST	Command	Clears the fault history log in the NV.
DRV.CLRFAULTS	Command	Tries to clear all active faults in the drive.
DRV.CMDSOURCE	NV	Sets the command source (service, fieldbus, analog input, gearing, digital, or Bode).
"DRV.CRASHDUMP" (page 86)	Command	Retrieves diagnostic information after the drive crashes.
"DRV.DBILIMIT" (page 87)	NV	Sets the maximum amplitude of the current for dynamic braking.

Parameter or Command	Type	Description
DRV.DEC	NV	Sets the deceleration value for the velocity loop.
"DRV.DIR" (page 90)	R/W	Changes drive direction.
DRV.DIS	Command	Disables the axis (software).
"DRV.DISMODE" (page 93)	NV	Sets disable type to either dynamic brake or immediate disable.
DRV.DISSOURCES	R/O	Returns the possible reason for a drive disable.
"DRV.DISTO" (page 95)	R/W	Sets the emergency timeout
DRV.DOWNLOAD	Command	Starts a new FW/FPGA download.
DRV.EMUEDIR	R/W	Sets the direction of the emulated encoder output (EEO) signal.
DRV.EMUEMODE	R/W	Sets the mode of the emulated encoder output (EEO) connector.
"DRV.EMUEMTURN" (page 98)	R/W	Defines the location of the index pulse on the EEO (emulated encoder output) when DRV.EMU-EMODE=2.
DRV.EMUERES	R/W	Sets the resolution of the EEO (emulated encoder output).
DRV.EMUEZOFFSET	R/W	Sets the resolution of the EEO (emulated encoder output).
DRV.EN	Command	Enables the axis (software).
DRV.ENDEFAULT	R/W	Sets the default state of the software enable
DRV.FAULTHIST	R/O	Reads the last 10 faults from NV memory.
DRV.FAULTS	R/O	Reads the active faults.
DRV.FLASHREAD	R/O	Reads a value from the serial flash.
DRV.HANDWHEEL	R/O	Reads the EEO input value.
DRV.HELP	R/O	Reads the minimum, maximum, and default values for a specific parameter or command.
DRV.HELPALL	R/O	Retrieves the minimum, maximum, default, and actual values for all available parameters and commands.
DRV.ICONT	R/O	Reads the continuous rated current value.
DRV.INFO	R/O	Reads general information about the drive.
DRV.IPEAK	R/O	Reads the peak rated current value.
DRV.IZERO	R/W	Sets the current that will be used during the DRV.ZERO procedure.
DRV.LIST	R/O	Reads the list of available parameters and com-mands.
DRV.LOGICVOLTS		Reads the logic voltages.
DRIVE NAME: DRV.NAME	NV	Sets and reads the name of the drive.
DRV.NVLIST	R/O	Lists the NV parameters and values from the RAM.
DRV.NVLOAD	W/O	"Loads all data from the NV memory of the drive into the RAM parameters." (page 119)
DRV.NVSAVE	Command	Saves the drive parameters from the RAM to the NV.

Parameter or Command	Type	Description
DRV.ONTIME	R/O	Returns how long the drive has been running since last power up.
DRV.OPMODE	NV	Sets the operation mode (current, velocity, or position).
DRV.READFORMAT	R/W	Sets the value returned to either decimal or hexadecimal.
DRV.RSTVAR	Command	Sets default values in the drive without re-booting the drive and without resetting the NV memory.
DRV.RUNTIME	R/O	Returns how long the drive has been running since first activated.
DRV.STOP	Command	This command stops all drive motion.
DRV.VER	R/O	Reads the drive version.
DRV.VERIMAGE	R/O	Returns the version data from each image.
DRV.TEMPERATURES	R/O	Reads the temperature of drive components.
"DRV.ZERO" (page 131)	R/W	Sets the zero mode. The procedure is activated when the drive is enabled.
Feedback (FB1)		
FB1.ENCRES	NV	Sets the resolution of the motor encoder.
FB1.HALLSTATE	R/O	Reads the resolution of the motor encoder.
FB1.IDENTIFIED	R/O	Reads the type of feedback device used by the drive/motor.
FB1.INITSIGNED	NV	Sets initial feedback value as signed or unsigned.
FB1.LDLL	R/O	Reads the motor line-to-line inductance from the FPGA.
FB1.LQLL	R/O	Reads the motor line-to-line inductance in the back emf axis (q axis) from the SFD memory from the FPGA.
FB1.MECHPOS	R/O	Reads the mechanical position.
FB1.MEMVER	R/O	Returns the memory feedback version.
FB1.MNUM	R/O	Returns the motor name/number.
FB1.MPHASE	NV	Set or get the commutation angle offset.
FB1.OFFSET	NV	Sets position feedback offset.
FB1.POLES	R/O	Reads the number of feedback poles.
FB1.OFFSET	NV	Sets position feedback offset.
FB1.POLES	R/O	Reads the number of feedback poles.
FB1.SELECT	NV	Sets user entered type or identified type (–1).
Fieldbus (FBUS)		
FBUS.PARAM1 TO FBUS.PARAM20	NV	Set fieldbus specific meanings.
FBUS.PLLTHRESH	NV	Sets number of successful synchronized cycles needed to lock the PLL.
FBUS.SAMPLEPERIOD	NV	Sets fieldbus sample period.
FBUS.SYNCACT	R/O	Reads actual distance from the desired sync distance.

Parameter or Command	Type	Description
FBUS.SYNCDIST	NV	Sets time target for synchronization.
FBUS.SYNCWND	NV	Sets symmetrically arranged window around the desired sync distance.
FBUS.TYPE	R/O	Shows the active fieldbus type.
Gearing (GEAR)		
GEAR.ACCMAX	R/W	Sets the maximum allowed acceleration value.
GEAR.DECMAX	R/W	Sets the maximum allowed deceleration value
GEAR.IN	R/W	Sets the denominator of the electronic gearing ratio.
GEAR.MODE	R/W	Selects electronic gearing mode.
GEAR.MOVE	Command	Starts the electronic gearing.
GEAR.OUT	R/W	Sets the numerator of the electronic gearing ratio
GEAR.VMAX	R/W	Maximum allowed velocity value
Homing (HOME)		
HOME.ACC	R/W	Sets homing acceleration.
HOME.DEC	R/W	Sets homing deceleration.
HOME.DIR	NV	Sets homing direction.
HOME.DIST	R/W	Sets homing distance.
HOME.FEEDRATE	R/W	Sets homing velocity factor.
HOME.IPEAK	R/W	Sets the current limit during homing procedure to a mechanical stop
HOME.MODE	R/W	Selects the homing mode.
HOME.MOVE	Command	Starts a homing procedure.
HOME.P	R/W	Sets home position.
HOME.PERRTHRESH	R/W	Position lag threshold.
HOME.SET	Command	Immediately sets the home position.
HOME.V	R/W	Sets homing velocity.
Hardware Limit Switch (HWLS)		
HWLS.NEGSTATE	R/O	Reads the status of the negative hardware limit switch.
HWLS.POSSTATE	R/O	Reads the status of the positive hardware limit switch.
Current Loop (IL)		
IL.BUSFF	R/O	Displays the current feedforward value injected by the fieldbus
IL.CMD	R/O	Reads the value of the q-component current controller inside the FPGA.
IL.CMDU	R/W	Sets the user current command.
IL.DCMD	R/O	Reads the value of the d-component current controller inside the FPGA.
IL.DCMD (Password Protected)	R/O	Reads the value of the d-component current controller inside the FPGA.
IL.DCMDU	R/W	User d-component current command.

Parameter or Command	Type	Description
IL.DEADBAND (Password Protected)	R/O	Dead-time of two IGBTs in series connection.
IL.DFB	R/O	Actual value of the d-component current.
IL.DFOLDD (Password Protected)	R/O	Reads the motor foldback maximum time at motor peak current.
IL.DFOLDR (Password Protected)	R/O	Reads the motor foldback recovery time.
IL.DFOLDT	R/O	Reads the motor foldback time constant of the exponential current drop (foldback).
IL.DIFOLD	R/O	Reads the drive foldback current limit.
IL.DLIMITN	R/W	Negative user (application) d-component current limit.
IL.DLIMITP	R/W	Positive user (application) d-component current limit.
IL.FB	R/O	Reads the actual value of the d-component current.
IL.FOLDFTHRESH	NV	IL.FOLDFTHRESH
IL.FOLDWTHRESH	NV	Sets the foldback warning level.
IL.IFOLD	R/O	Reads the overall foldback current limit.
IL.INTEN	NV	Enables/Disables the integrator part of the PI-loop.
IL.IUOFFSET (Password Protected)	R/W	Offset, which is added to the sigma-delta measured current value in the u-winding.
IL.IUFB	R/O	Sigma/Delta measured current in the u-winding of the motor.
IL.IVFB*	R/W	Sigma/Delta measured current in the u-winding of the motor.
IL.IVOFFSET*	R/W	Offset added to the sigma-delta measured current value in the v-winding.
IL.KP	NV	Sets the proportional gain of the q-component of the PI regulator.
IL.KPDRATIO	NV	IL.KPDRATIO
IL.LIMITN	NV	Sets the negative user (application) current limit.
IL.LIMITP	NV	Sets the positive user (application) current limit.
IL.MFOLDD	NV	Sets the motor foldback maximum time at motor peak current.
IL.MFOLDR	R/O	Sets the motor foldback recovery time.
IL.MFOLDT	NV	Sets the motor foldback time constant of the exponential current drop (foldback).
IL.MIFOLD	R/O	Sets the motor foldback current limit.
IL.PWMFREQ*	NV	PWM frequency of the IGBTs.
IL.VDCMD	R/O	Output of the d-component PI-regulator.
IL.VCMD	R/O	Sets the output of the q-component PI regulator.
IL.VUFB	R/O	Reads the measured voltage on the u-winding of the motor.

Parameter or Command	Type	Description
IL.VVFB	R/O	Reads the measured voltage on the v-winding of the motor.
IL.DLIMITN	R/W	Negative user (application) d-component current limit.
IL.DLIMITP	R/W	Positive user (application) d-component current limit.
IL.FB	R/O	Reads the actual value of the d-component current.

Motor (MOTOR) Parameters		
MOTOR.BRAKE	NV	Sets the presence or absence of a motor brake.
MOTOR.TBRAKEAPP	NV	The delay time used for applying the motor brake.
MOTOR.TBRAKERLS	NV	The delay time used for releasing the motor brake.
MOTOR.ICONT	NV	Sets the motor continuous current.
MOTOR.INERTIA	NV	Sets the motor inertia.
MOTOR.IPEAK	NV	Sets the motor peak current.
MOTOR.KT	NV	Sets the torque constant of the motor.
MOTOR.LQLL	NV	Sets the line-to-line motor Lq.
MOTOR.VMAX	NV	Sets the maximum motor speed.
MOTOR.NAME	NV	Sets the motor name.
MOTOR.PHASE	NV	Sets the motor phase.
MOTOR.PITCH	NV	Sets the motor pitch.
MOTOR.POLES	NV	Sets the number of motor poles.
MOTOR.R	NV	Sets the stator winding resistance phase-phase in ohms.
MOTOR.TEMP	R/O	Reads the motor temperature represented as the resistance of the motor PTC.
MOTOR.TEMPFAULT	NV	Sets the motor temperature fault level.
MOTOR.TEMPWARN	NV	Sets the motor temperature warning level.
MOTOR.TYPE	NV	Sets the motor type.
MOTOR.VOLTMAX	NV	Sets the motor maximum voltage.
Motion Task (MT)		
MT.ACC	R/W	Specifies motion task acceleration.
MT.CLEAR	Command	Clears motion tasks from the drive.
MT.CNTL	R/W	Sets motion task control word.
MT.CONTINUE	Command	Continues a stopped motion task.
MT.DEC	R/W	Motion task deceleration.
MT.EMERGMT	R/W	Selects a motion task to be triggered after an emergency stop procedure.
MT.MTNEXT	R/W	Specifies following motion task number.
MT.TNEXT	R/W	Specifies following motion task time.
MT.LIST	Command	Lists all initialized motion tasks in the drive.

MT.LOAD	Command	Reads/loads a motion task number from the drive.
MT.MOVE	Command	Starts a motion task.
MT.NUM	R/W	Motion task number.
MT.PARAMS	Command	Shows a motion task.
MT.P	R/W	Motion task position.
MT.SET	Command	Sets the motion task in the drive.
MT.TNUM	R/W	Motion task customer table number.
MT.V	R/W	Motion task velocity.
Position Loop (PL)		
PL.CMD	NV	Reads the position command directly from the entry to the position loop.
PL.ERR	NV	Returns the position following an error.
PL.ERRFTHRESH		Sets the maximum position error.
PL.ERRWTHRESH		Sets the position error warning level.
PL.FB	R/O	Reads the position feedback value.
PL.FBSOURCE		Sets the feedback source for the position loop.
PL.INTINMAX	NV	Limits the input of the position loop integrator by setting the input saturation.
PL.INTOUTMAX	NV	Limits the output of the position loop integrator by setting the output saturation.
PL.KD	NV	The derivative gain of the position loop.
PL.KI	NV	Sets the integral gain of the position loop.
PL.KP	NV	Sets the proportional gain of the position regulator PID loop.
Position Register Switches (PLS)		
PLS.CLR		Defines which position register to clear.
PLS.EN		Enables the position registers.
PLS.MODE		Selects position register mode.
PLS.POLARITY		Sets the polarity of the position registers.
PLS.P01 TO PLS.P16		Position register compare value.
PLS.STATE		Reads the status of the position registers.
Recorder (REC)		
REC.ACTIVE	R/O	Indicates if data recording is in progress (active).
REC.CH1 to REC.CH6	R/W	Sets recording channels 1 to 6.
REC.DONE	R/O	Checks whether or not the recorder has finished recording.
REC.GAP	R/W	Specifies the gap between consecutive samples.
REC.NUMPOINTS	R/W	Sets the number of points to record.
REC.OFF	R/W	Turns the recorder OFF.
REC.RETRIEVE	R/O	Transfers all the recorded data to the communication channel.
REC.STOPTYPE	R/W	Sets the recorder stop type.
REC.TRIG	Command	Triggers the recorder.
REC.TRIGSLOPE	R/W	Sets the trigger slope.

REC.TRIGTYPE	R/W	Sets the trigger type.
REC.TRIGVAL	R/W	Sets the trigger value.
Regen Resistor (REGEN)		
REGEN.IMPEXT	NV	Sets the external user defined regen resistor thermal impedance.
REGEN.IMPEXTHLF	NV	he external user defined regen resistor's thermal impedance.
REGEN.REXT	NV	Sets the external, user-defined regen resistor resistance.
PARAMETER: REGEN.TYPE	NV	Sets the regen resistor type.
REC.TRIGPOS	R/W	Sets the position in the recording buffer in which to set the trigger.
VBUS.UVFTHRESH	R/O	Reads the under voltage fault level.
VBUS.OVFTHRESH	R/O	Reads the over voltage fault level.
MEASURED BUS VOLTAGE: VBUS.VALUE	R/O	Reads DC bus voltage.
Units (UNIT)		
UNIT.ACCLINEAR	NV	Sets the linear acceleration/deceleration units.
UNIT.ACCROTARY	NV	Sets the rotary acceleration/deceleration units.
UNIT.LABEL	NV	Sets user-defined name for user-defined position units.
UNIT.PIN	NV	Sets gear IN for the unit conversion.
UNIT.PLINEAR	NV	Sets the linear position units.
UNIT.POUT	NV	Sets gear out for the unit conversion.
UNIT.PROTARY	NV	Sets the position units when the motor type (MOTOR.TYPE) is rotary.
UNIT.VLINEAR	NV	Sets the linear velocity units.
UNIT.VROTARY	NV	Sets the velocity units when the motor type (MOTOR.TYPE) is rotary.
Bus voltage (VBUS)		
VBUS.OVFTHRESH	R/O	Reads the over voltage fault level.
"VBUS.OVFWTHRESH" (page 338)	N/V	Sets voltage level for over voltage warning.
"VBUS.RMSLIMIT" (page 339)		Reads the limit for the bus capacitors load.
"VBUS.UVFTHRESH" (page 340)	R/O	Reads the under voltage fault level.
"VBUS.UVMODE" (page 341)		Indicates undervoltage (UV) mode.
"VBUS.UVWTHRESH" (page 342)	NV	Sets voltage level for undervoltage warning.
"Measured Bus Voltage: VBUS.VALUE" (page 343)	R/O	Reads DC bus voltage.
Velocity Loop (VL)		
VL.ARPF1 TO VL.ARPF4	R/W	Sets the natural frequency of the pole (denominator) of anti-resonance (AR) filters 1, 2, 3, and 4.
VL.ARPQ1 TO VL.ARPQ4	R/W	Sets the Q of the pole (denominator) of anti-resonance (AR) filter 1.

VL.ARTYPE1 TO VL.ARTYPE4	NV	Indicates the method used to calculate BiQuad coefficients.
VL.ARZF1 TO VL.ARZF4	R/W	Sets the natural frequency of the zero (numerator) of anti-resonance (AR)filter 1.
VL.ARZQ1 TO VL.ARZQ4	R/W	Sets the Q of the zero (numerator) of anti-resonance filter #1.
VL.BUSFF	R/O	Displays the velocity loop feedforward value injected by the field-bus
VL.CMD	R/O	Reads the actual velocity command.
VL.CMDU	R/W	Sets the user velocity command.
VL.ERR	R/O	Sets the velocity error.
VL.FB	R/O	Reads the velocity feedback.
VL.FBFILTER		Filters VL.FB value.
VL.FBSOURCE		Sets feedback source for the velocity loop.
VL.FF		Displays the velocity loop overall feedforward value.
VL.GENMODE	NV	Selects mode of velocity generation (Observer, d/dt).
VL.KBUSFF		Sets the velocity loop acceleration feedforward gain value.
VL.KI	NV	Sets the velocity loop integral gain for the PI controller.
VL.KP	NV	Sets velocity loop proportional gain for the PI controller.
VL.KVFF	R/W	Velocity loop velocity feedforward gain value
VL.LIMITN	NV	Sets the velocity lower limit.
VL.LIMITP	NV	Sets the velocity high limit.
VL.LMJR		Sets the ratio of the estimated load moment of inertia relative to the motor moment of inertia.
VL.THRESH	NV	Sets the over speed fault value.

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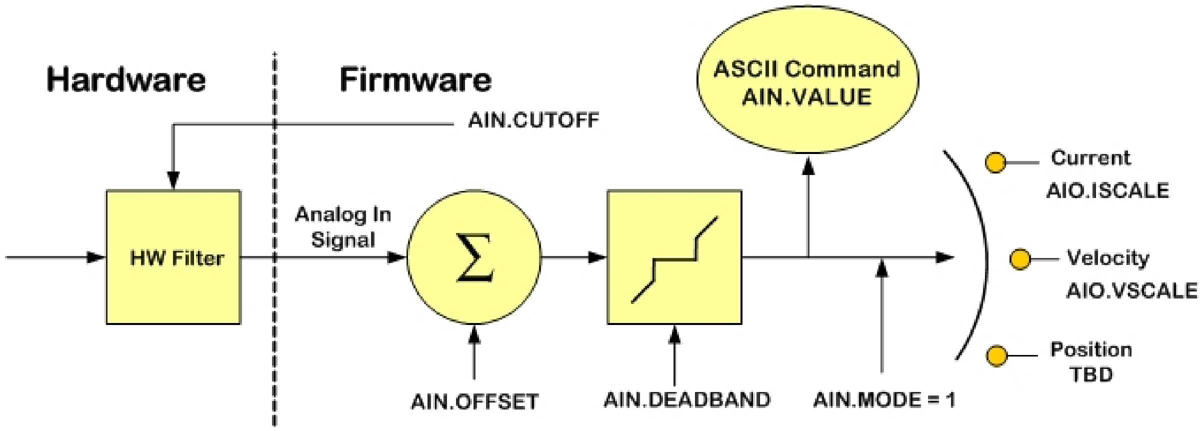
AIN Parameters

This section describes the analog input (AIN) parameters. AIN parameters function as shown in the block diagram below:

Analog Input Block Diagram



AIN.CUTOFF

General Information	
Type	NV Parameter
Description	Sets the analog input low-pass filter cutoff frequency.
Units	Hz
Range	0 to 10,000 Hz
Default Value	5,000 Hz
Data Type	Float
See Also	Analog Input Block Diagram
Start Version	M_0-0-15

Description

AIN.CUTOFF sets the break frequency in Hz for two cascaded single-pole low-pass filters on the hardware command input. Since the two poles are cascaded at the same frequency, the -3 dB frequency is 0.64*A-IN.CUTOFF in hertz and the 10% to 90% step response rise time is 0.53/AIN.CUTOFF in seconds.

Suggested operating values are as follows:

- Analog torque opmode: 5 kHz
- Analog velocity opmode: 2.5 kHz
- General purpose analog input high resolution: 500 Hz

See the Velocity Controller Environment Block Diagram for the drive controller environment.

AIN.DEADBAND

General Information	
Type	NV Parameter
Description	Sets the analog input signal deadband.
Units	V
Range	0 to 12.5 V
Default Value	0 V
Data Type	Float
See Also	Analog Input Block Diagram
Start Version	M_0-0-15

Description

AIN.DEADBAND sets the deadband of the analog input signal. If the absolute value of the analog input signal is less than the AIN.DEADBAND value, then no analog command signal is generated.

AIN.OFFSET

General Information	
Type	NV Parameter
Description	Sets the analog input offset.
Units	V
Range	–10 to +10 V
Default Value	0 V
Data Type	Float
See Also	Analog Input Block Diagram, AIN.ZERO
Start Version	M_0-0-15

Description

AIN.OFFSET sets the analog offset, which is added to the analog input command to the drive. This value compensates for the analog input signal (AIN.VALUE) offset or drift.

AIN.VALUE

General Information	
Type	R/O Parameter
Description	Reads the value of the analog input signal.
Units	V
Range	-12.5 to +12.5 V
Default Value	N/A
Data Type	Float
See Also	AIN.OFFSET, AIN.ZERO, Analog Input Block Diagram
Start Version	M_0-0-15

Description

AIN.VALUE reads the analog input value after the value is filtered (as shown in the Analog Input Block Diagram).

AIN.ZERO

General Information	
Type	Command
Description	Zeroes the analog input signal.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	AIN.VALUE, AIN.OFFSET
Start Version	M_0-0-50-0

Description

AIN.ZERO causes the drive to zero the analog input signal (AIN.VALUE). You may need to execute this command more than once to achieve zero offset, and AIN.OFFSET is modified in this process.

AIO Parameters

AIO.ISCALE

General Information	
Type	NV Parameter
Description	Sets current scale factor.
Units	A/V
Range	0.001 to 22.4 A/V
Default Value	0.001 A/V
Data Type	Float
See Also	Analog Input Block Diagram
Start Version	M_0-0-15

Description

AIO.ISCALE sets the analog current scale factor that scales:

- The analog input (AIN.VALUE) for DRV.OPMODE = 0 (analog torque mode), DRV.CMDSOURCE = 3 (analog)
- The analog output (AOUT.VALUE) for AOUT.MODE = 5 or 6. The value entered is the motor current per 1 V of analog input or output. This value may be either higher or lower than 100%, but the actual analog I/O will be limited by the application current limit (IL.LIMITN and IL.LIMITP).

AIO.PSCALE

General Information	
Type	NV Parameter
Description	Sets position scale factor.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR Rotary: counts/V,rad/V, deg/V, (PIN/POUT)/V, counts 16 bit/V Linear: counts/V, mm/V, um/V, (PIN/POUT)/V, counts 16 bit/V
Range	Rotary: 1 to 9,223,372,036,854,775 counts/V 0 to 13,493,026.816 rad/V 0 to773,094,113.280 deg/V 0 to 10,737,418.240 (PIN/POUT)/V 0 to 140,737,488,355.327 counts 16 bit/V Linear: 1 to 9,223,372,036,854,775 counts/V 0 to 2147483.648 mm/V 0 to 2147483648.000 um/V 0 to 10737418.240 (PIN/POUT)/V 0 to 140737488355.327 counts 16 bit/V
Default Value	Rotary: 1 counts/V 0 rad/V 0 deg/V 0 (PIN/POUT)/V 0 counts 16 bit/V Linear: 1 count/V 0 rad/V 0 deg/V 0 (PIN/POUT)/V 0 counts16 bit/V
Data Type	Float
See Also	Analog Input Block Diagram
Start Version	M_00-00-56-000

Description

AIO.PSCALE is an analog position scale factor that scales:

1. The analog input (AIN.VALUE) for DRV.OPMODE = 2 , DRV.CMDSOURCE = 3 (analog position mode)

2. The analog output (AOUT.VALUE) for AOUT.MODE = 6, or 7. (actual position or position error) per 10 V of analog input or output.

AIO.VSCALE

General Information	
Type	NV Parameter
Description	Sets velocity scale factor.
Units	Depends on UNIT.VROTARY or UNIT.ACCLINEAR Rotary: rpm/V, rps/V, (deg/s)/V, [(PIN/POUT)/s]/V, (rad/s)/V Linear: counts/s/V, (mm/s)/V, (um/s)/V, [(PIN/POUT)/s]/V
Range	Rotary: 0.060 to 60,000 rpm/V 0.001 to 1,000 rps/V 0.359 to 360,000 (deg/s)/V 0.005 to 5,000 [(PIN/POUT)/s]/V 0.006 to 6,283.186 (rad/s)/V Linear: 0.001 to 1.000 counts/s/V 0.001*MOTOR.PITCH to 1,000.000*MOTOR.PITCH (mm/s)/V 0.998*MOTOR.PITCH to 1,000,000.000*MOTOR.PITCH (um/s)/V 0.005 to 5,000 [(PIN/POUT)/s]/V
Default Value	Rotary: 0.060 rpm/V 0.001 rps/V 0.359 (deg/s)/V 0.005 [(PIN/POUT)/s]/V 0.006 (rad/s)/V Linear: 0.001 counts/s/V 0.001*MOTOR.PITCH (mm/s)/V 0.998*MOTOR.PITCH (um/s)/V 0.005 to 5,000 [(PIN/POUT)/s]/V
Data Type	Float
See Also	Analog Input Block Diagram
Start Version	M_0-0-15

Description

AIO.VSCALE is an analog velocity scale factor that scales:

1. The analog input (AIN.VALUE) for DRV.OPMODE = 2 (analog velocity mode)
2. The analog output (AOUT.VALUE) for AOUT.MODE = 1, 3, or 7. The value entered is the motor velocity per 10 V of analog input or output. This value may be either higher or lower than the application velocity limit (VL.LIMITP or VL.LIMITN), but the actual analog I/O will be limited by VL.LIMITP or VL.LIMITN.

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AOUT Parameters

AOUT.MODE

General Information	
Type	NV Parameter
Description	Sets the analog output mode.
Units	N/A
Range	0 to 9
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3470h/1
Data Type	Integer 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

AOUT.MODE sets the analog output functionality.

AOUTx.MODE	Description
0	User variable. The analog output signal is determined by the user (using AOUT.VALUEU).
1	Actual velocity. The analog signal describes the current velocity value.
2	Velocity error. The analog signal describes the velocity error value.
3	Velocity command. The analog signal describes the velocity command value.
4	Actual current. The analog signal describes the actual current value.
5	Current command. The analog signal describes the current command value.
6	Actual position. The analog signal describes the current position value.
7	Position error. The analog signal describes the position error value.
8	Triangle wave. The analog signal is a triangle wave (sawtooth pattern).
9	Debug mode. In this mode the user can define a drive variable to monitor via the analog output (AOUT.VALUEU).

Example

Using the command AOUT.VALUEU, you can implement a voltage output. As an example:

-->AOUT.MODE 0

-->AOUT.VALUEU 5

-->AOUT.VALUEU 4.33

AOUT.OFFSET

General Information	
Type	NV Parameter
Description	Sets the analog input offset.
Units	V
Range	-10 to +10 V
Default Value	0 V
Data Type	Float
See Also	N/A
Start Version	M_00-00-65-000

Description

This parameter sets the analog input offset.

AOUT.VALUE

General Information	
Type	N/V Parameter
Description	Reads the analog output value.
Units	V
Range	–10 to +10 V
Default Value	0
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3470h/2
Data Type	Integer 16
PDO Mappable	N/A
Start Version	

Description

AOUT.VALUE reads the analog output value. This parameter can also be used to set the value of the analog output when AOUT.MODE = 0 (analog output signal is determined by the user).

AOUT.VALUEU

General Information	
Type	R/W parameter
Description	Sets the analog output value.
Units	V
Range	–10 to +10 V
Default Value	0
Data Type	Float
See Also	N/A
Start Version	M_00-00-50-000

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3470h/3
Data Type	Integer 16
PDO Mappable	Yes
Start Version	M_00-00-62-000

Description

AOUT.VALUEU reads/writes the analog output value when AOUT.MODE = 0 (analog output signal is determined by the user).

BODE Parameters

BODE.EXCITEGAP

General Information	
Type	R/W Parameter
Description	Controls how often the excitation is updated.
Units	Drive samples
Range	1 to 255 drive samples
Default Value	2 drive samples
Data Type	N/A
See Also	BODE.MODE
Start Version	M_0-0-30

Description

BODE.EXCITEGAP controls how often the excitation is updated. The excitation is updated every n drive samples, where n is BODE.EXCITEGAP. For example, if BODE.EXCITEGAP = 2, then the excitation is updated every 1 / (2 * 16000 Hz) = 1 / 8000 Hz = 0.000125 sec. When measuring a system, update the excitation only as often as the data is recorded.

Example

Set excitation update rate to 8,000 Hz:

-->BODE.EXCITEGAP 2

Set excitation update rate to 4,000 Hz:

-->BODE.EXCITEGAP 4

Get excitation update rate (already set to 8000 Hz)

-->BODE.EXCITEGAP 2

BODE.FREQ

General Information	
Type	R/W Parameter
Description	Sets the frequency of the sine excitation source.
Units	Hz
Range	0 to 8,000 Hz
Default Value	0 Hz
Data Type	Float
See Also	BODE.MODE BODE.INJECTPOINT, BODE.IAMP, BODE.VAMP
Start Version	M_0-0-30

Description

BODE.FREQ sets the frequency of the sine excitation source in Hz. The sine excitation source is used to take frequency response measurements of a system.

Example

Setting up a sine excitation source of 0.2 A at 50 Hz:

-->BODE.INJECTPOINT 1

-->BODE.IAMP 0.2

-->BODE.FREQ 50.0

-->BODE.MODE 2

BODE.IAMP

General Information	
Type	R/W Parameter
Description	Sets current command value used during the Bode procedure.
Units	A
Range	+/- Combined drive and motor current limit
Default Value	0.2 A
Data Type	Float
See Also	BODE.INJECTPOINT, BODE.FREQ
Start Version	M_0-0-30

Description

BODE.IAMP sets the amplitude of the excitation when in current mode as set in BODE.INJECTPOINT. When using BODE.MODE = 1 and BODE.INJECTPOINT = 1, this parameter will determine the level of noise injected to commanded current value.

Example

Set the excitation current to 0.2 A

-->BODE.IAMP 0.2

Get the excitation current (already set to 0.2 A)

-->BODE.IAMP 0.200 [A]

BODE.INJECTPOINT

General Information	
Type	R/W Parameter
Description	Sets whether the excitation uses current or velocity excitation type.
Units	N/A
Range	0 to 2
Default Value	0
Data Type	Integer
See Also	BODE.IAMP, BODE.MODE, BODE.VAMP
Start Version	M_0-0-30

Description

BODE.INJECTPOINT sets whether the excitation uses current or velocity excitation type.

BODE.INJECTPOINT	Description
0	None
1	Current
2	Velocity

Example

Set BODE.INJECTPOINT to current:

-->BODE.INJECTPOINT 1

Get BODE.INJECTPOINT (already set to current)

-->BODE.INJECTPOINT

1

BODE.MODE

General Information	
Type	R/W Parameter
Description	Sets the mode of the excitation.
Units	N/A
Range	0 to 4
Default Value	0
Data Type	Integer
See Also	BODE.INJECTPOINTBODE.VAMP
Start Version	M_0-0-30

Description

BODE.MODE sets the mode of the excitation.. The excitation can be set to the modes shown in the table below. BODE.MODE is always set to **None** when Ethernet communication is disconnected. The peak amplitude of the excitation is set by either BODE.IAMP or BODE.VAMP (depending on BODE.INJECTPOINT).

BODE.MODE	Description	Comments
0	None	Turns all excitation off
1	PRB	Uses Pseudo Random Binary (PRB)excitation. PRB is a signal that is always +/- peak amplitude, varying only in phase. PRB excitation results in a flat excitation frequency spectrum. PRB results in a high peak excitation amplitude, which can help minimize friction in a frequency response test. PRB excitation repeats every (2^BODE.PRBDEPTH) / BODE.EXCITEGAP drive samples. This repetition can be used to see through the effects of friction.
2	Sine	Uses Sine excitation
3	Noise	Uses Random Noise excitation. Noise is a random number generator that varys between +/- peak amplitude.
4	Offset	Sets a torque offset equal to BODE.IAMP

Example

Set BODE.MODE to PRB:

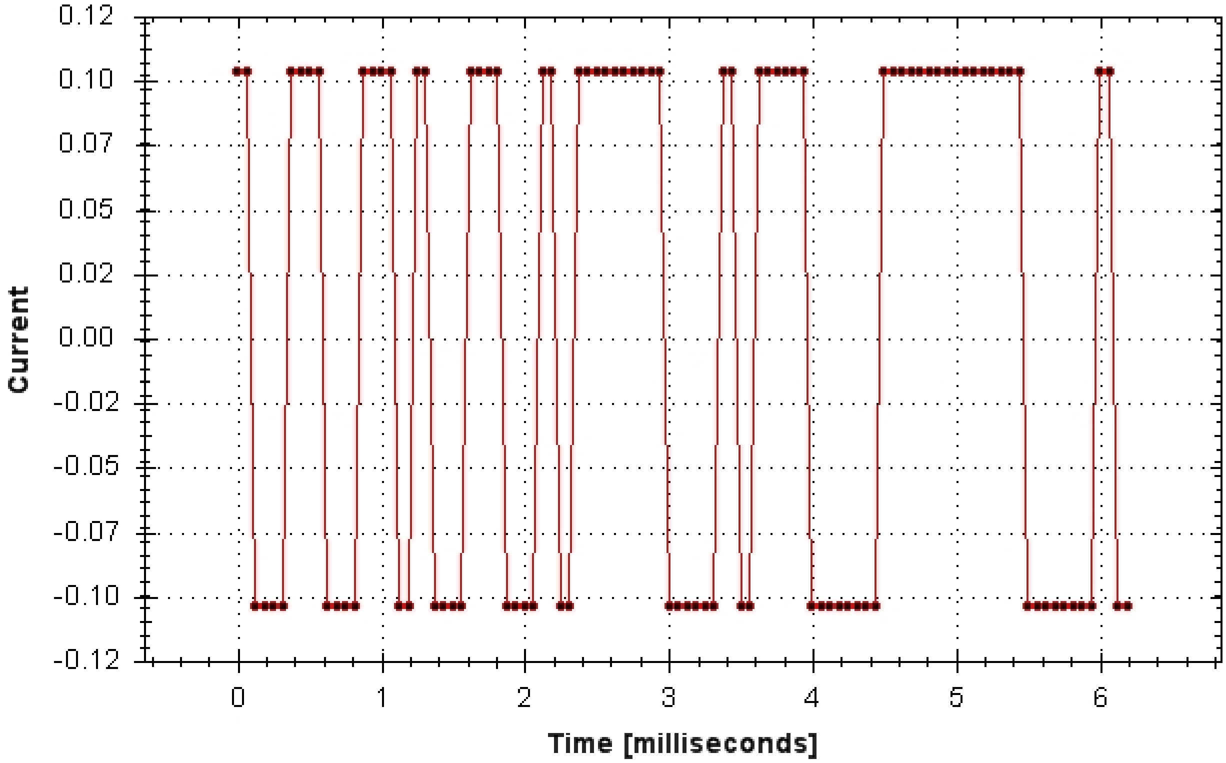
-->BODE.MODE 1

Get BODE.MODE (already set to PRB):

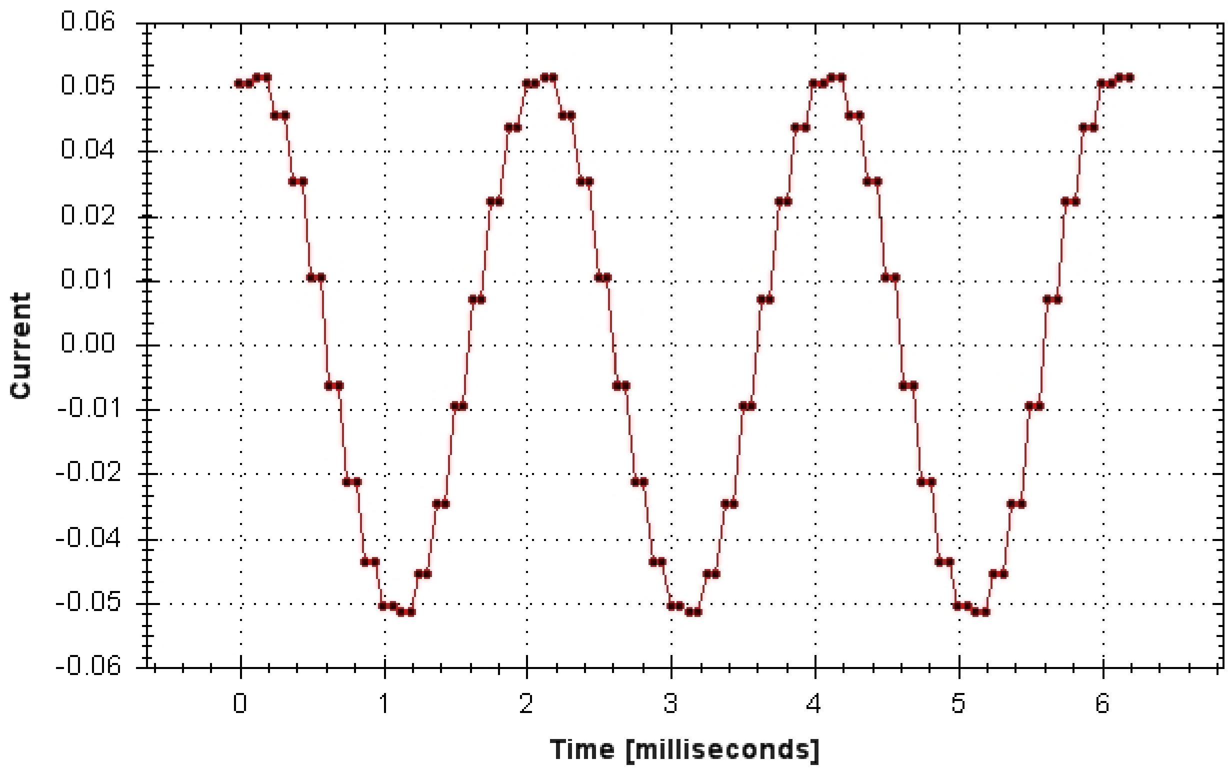
-->BODE.MODE

1

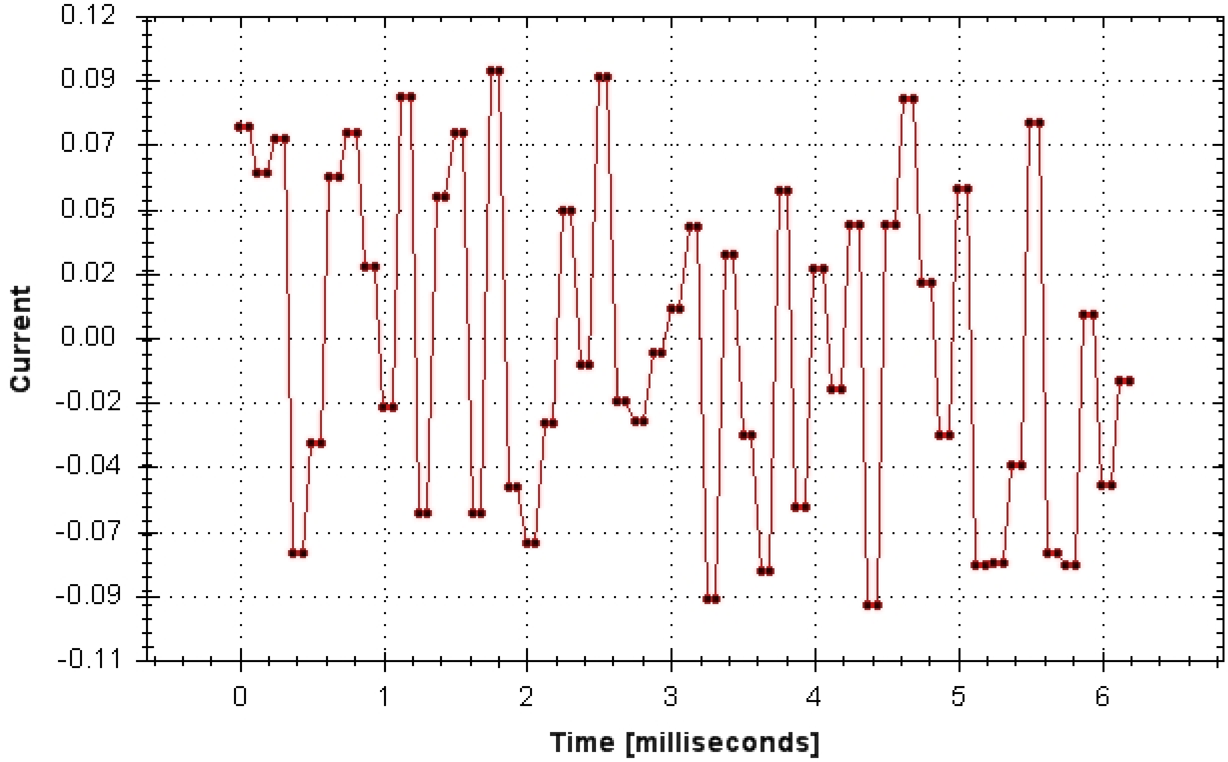
PRB excitation:



Sine excitation:



Noise excitation:



BODE.PRBDEPTH

General Information	
Type	R/W Parameter
Description	Sets the length of the PRB signal before it repeats.
Units	NA
Range	4 to 19
Default Value	19
Data Type	Integer
See Also	BODE.MODE, BODE.INJECTPOINT, BODE.IAMP, BODE.VAMP
Start Version	M_0-0-30

Description

BODE.PRBDEPTH sets the length of the PRB signal before it repeats. This applies only when BODE.MODE = PRB. The PRB excitation will repeat after (2^BODE.PRBDEPTH) / BODE.EXCITEGAP drive samples.

Example

Set BODE.PRBDEPTH to 19:

-->BODE.PRBDEPTH 19

Get BODE.PRBDEPTH (already set to 19):

-->BODE.PRBDEPTH

19

BODE.VAMP

General Information	
Type	R/W Parameter
Description	Sets the amplitude of the excitation when in velocity mode.
Units	rpm
Range	0 to maximum motor speed
Default Value	0
Data Type	Float
See Also	BODE.MODE, BODE.INJECTPOINT
Start Version	M_0-0-30

Description

BODE.VAMP sets the amplitude of the excitation when in velocity mode as set in BODE.INJECTPOINT.

Example

Set the excitation velocity to 100 RPM

-->BODE.VAMP 100

Get the excitation velocity(already set to 100 RPM)

-->BODE.VAMP

100.000 [rpm]

CAP Parameters

CAP0.EDGE, CAP1.EDGE

General Information	
Type	R/W Parameter
Description	Selects the capture edge.
Units	N/A
Range	1 to 3
Default Value	1
Data Type	U8
See Also	CAP0.PREEDGE, CAP1.PREEDGE
Start Version	M_0-0-50-0

Description

The filtered trigger source is monitored for rising edge, falling edge, or both edges. The event mode logic may ignore the precondition edge detection; however, the trigger always uses edge detection.

The precondition logic has an identical feature controlled by CAP0.PREEDGE, CAP1.PREEDGE.

Value	Description
0	Reserved
1	Rising edge
2	Falling edge
3	Both edges

CAP0.EN, CAP1.EN

General Information	
Type	R/W Parameter
Description	Enables or disables the related capture engine.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter enables or disables the related capture engine. After each successful capture event, this parameter is reset to 0 and must be activated again for the next capture. Also note that CAP0.PLFB, CAP1.PLFB is set to 0 when this parameter is set to 1.

0 = Disable

1 = Enable

CAP0.EVENT, CAP1.EVENT

General Information	
Type	R/W Parameter
Description	Controls the precondition logic.
Units	N/A
Range	0 to 3
Default Value	0
Data Type	U8
See Also	N/A
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3460h/5, 3460h/6
Data Type	Unsigned 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

The event mode controls use of the precondition logic. The four event modes are listed below.

Event	Description
0	Trigger Event = Trigger edge (ignore precondition)
1	Trigger Event = Trigger edge after precondition edge
2	Trigger Event = Trigger edge while precondition = 1
3	Trigger Event = Trigger edge while precondition = 0

Example

Event 0

The following diagram shows an example of Event = 0 (trigger on edge, trigger edge = rising). In this mode, the precondition logic is ignored.

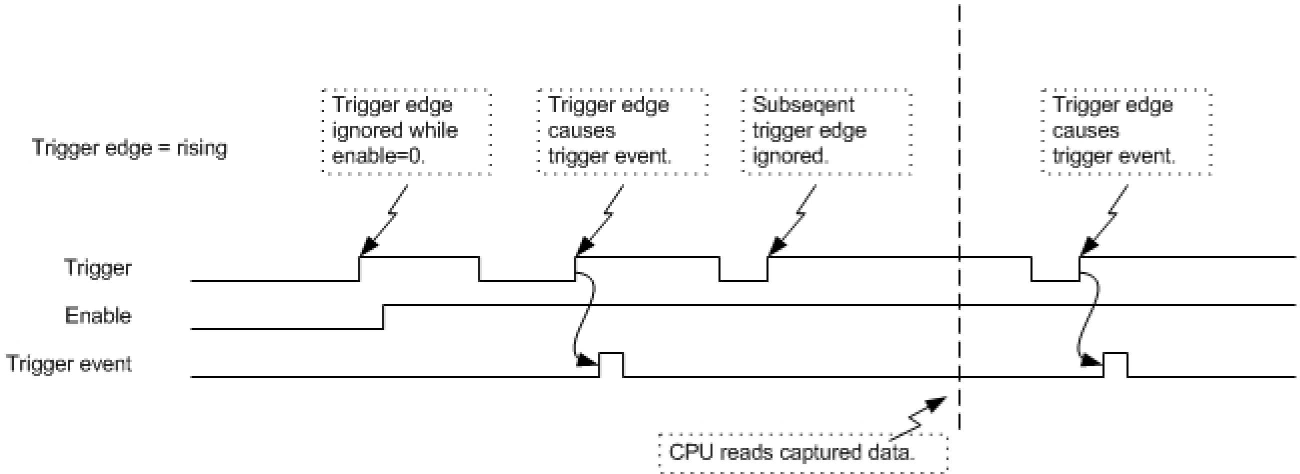


Figure 1: Trigger Edge Mode

Events 2 and 3 (Trigger edge while precondition = 0 or 1)

In these events, the precondition logic samples the current (post-filter) state of the selected precondition source input. The capture engine looks for a trigger edge while the precondition input is at a “1” or “0” state.

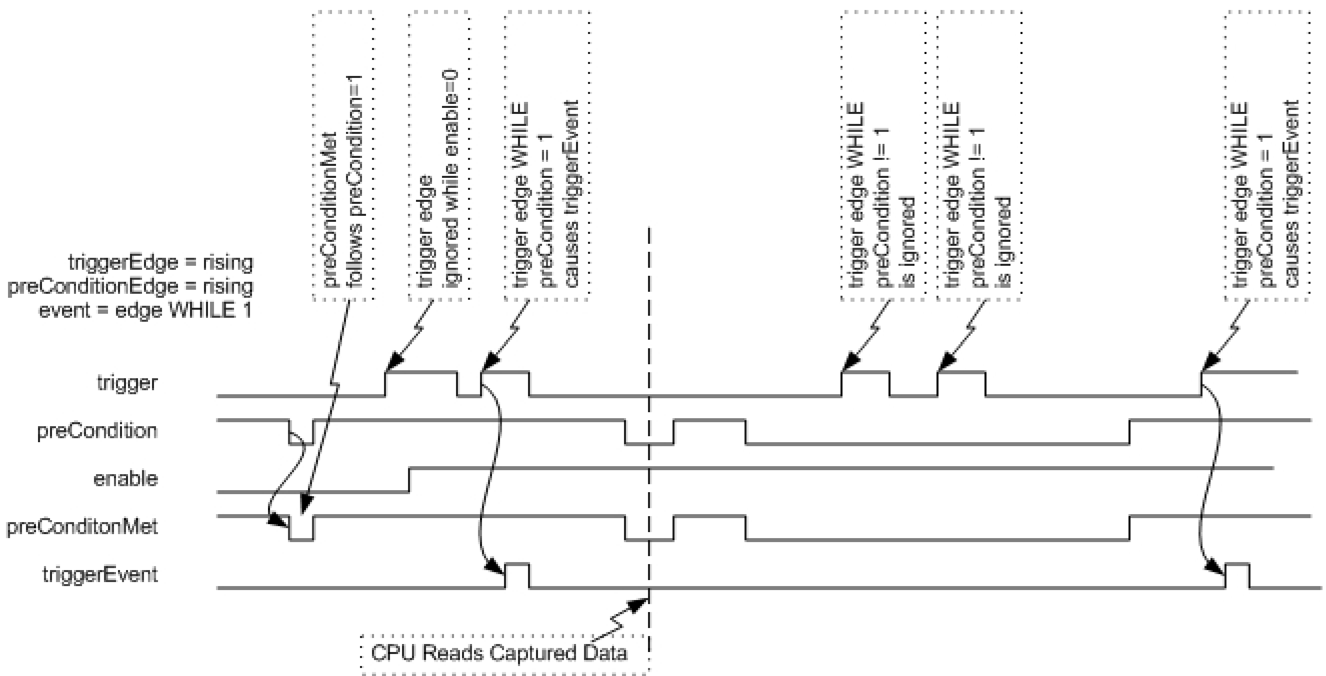


Figure 2: Trigger edge WHILE precondition edge

Event 1 (Trigger edge after precondition)

In this event, each trigger event requires Enable=1, a new precondition edge, followed by a new trigger edge. The sequence requirements are shown in the figure below.

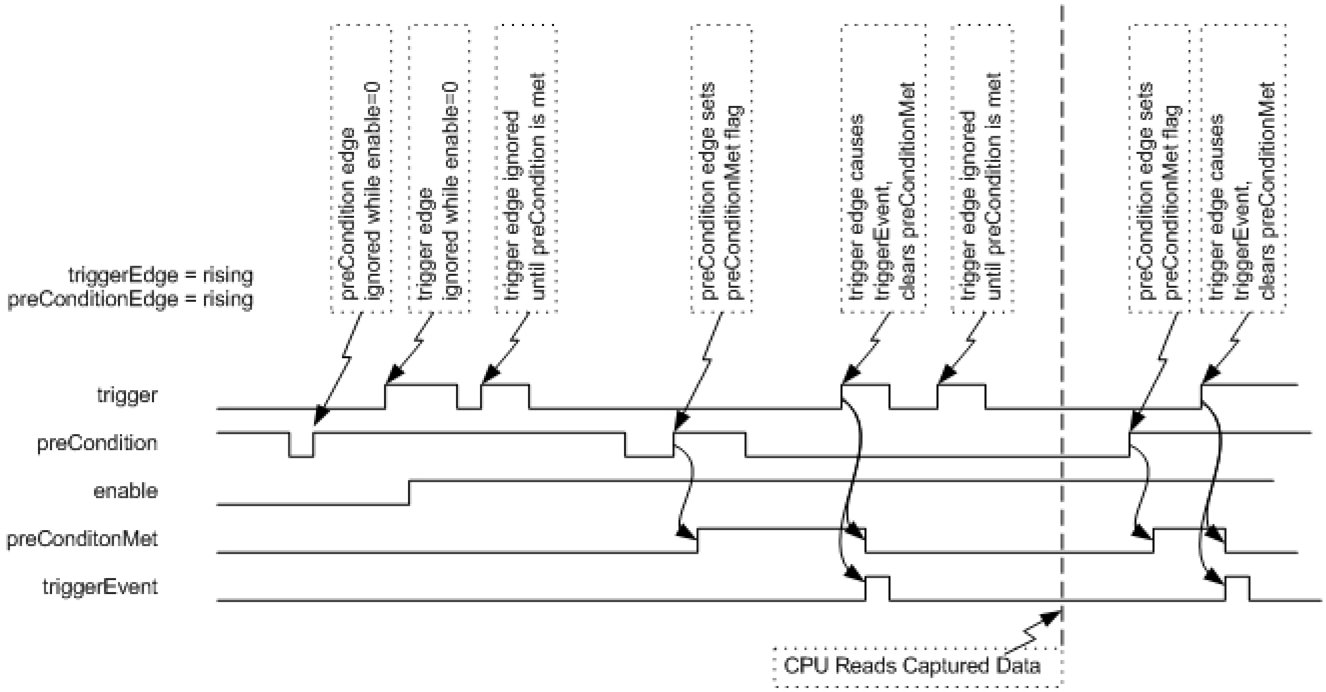


Figure 3: Trigger edge after precondition edge

Note: If the precondition and trigger edges occur at the same time, it is not a valid trigger event. A subsequent trigger edge must occur after the precondition edge. The same time resolves to a single 40 ns clock tick in the trigger event logic (after the optional filter function as well as any sensor, cable, or noise delays).

CAP0.FILTER, CAP1.FILTER

General Information	
Type	R/W Parameter
Description	Sets the filter for the capture source input.
Units	N/A
Range	0 to 2
Default Value	0
Data Type	U8
See Also	CAP0.PREFILTER, CAP1.PREFILTER
Start Version	M_0-0-50-0

Description

An optional glitch filter may be used to debounce the input trigger signals. By default the filter is disabled. A 0.6 µs filter may be selected for fast signals such as RS422, or fast opto. A 40 µs filter may be selected for slow opto inputs. Exact values for each filter mode are listed below (the precondition logic has an identical filter).

Filter Mode (if no glitch)	Trigger Filter (filter clock enable period)	Filter Delay			
		Min (µs)	Typical (µs)	Max (µs)	(µs)
off	0	N/A	N/A	N/A	N/A
(default)	0	0	0	N/A	N/A
fast	1	0.56	0.6	0.64	0.80
slow	2	35.84	38.4	40.96	5.12

The filter uses seven stages of delay when enabled. An input glitch restarts the filter delay. The clock enable period for the seven stage filter is set to 0.080 us for the fast filter, 5.12 us for the slow filter. The filter delay for a clean input edge is therefore an average of 7.5 periods (+/-0.5 period for worst case).

CAP0.MODE, CAP1.MODE

General Information	
Type	NV Parameter
Description	Selects the captured value.
Units	N/A
Range	0 to 3
Default Value	0
Data Type	U8
See Also	N/A
Start Version	M_00-00-51-000

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3460h/3, 3460h/4
Data Type	Unsigned 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

Mode 0 is the standard position capture which stores PL.FB. Data can be retrieved with CAP0.PLFB, CAP1.PLFB.

Mode 1 is the drive internal time capture. Data can be retrieved with CAP0.T, CAP1.T.

Mode 2 is the KMS EtherCAT distributed clock time (DCT) capture. Instead of using a position value, the DCT is calculated. There is no user parameter to retrieve the captured DCT.

Mode 3 is the capture of primary encoder signal. It is used to home onto a feedback index. Mode 3 sets other parameters needed for this mode. These parameters can be changed afterwards, but this practice is not recommended.

CAP0.PLFB, CAP1.PLFB

General Information	
Type	R/O Parameter
Description	Sets captured position value.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: counts, rad, deg, PIN/POUT, counts 16 bit Linear: counts, mm, µm, PIN/POUT, counts 16 bit
Range	Full range of a signed 64 bit variable
Default Value	0
Data Type	S64
See Also	UNIT.PROTARY, UNIT.PLINEAR
Start Version	M_0-0-51-0-0

Description

This parameter sets the captured position value scaled to actual set units. See UNIT.PROTARY or UNIT.PIN for these units.

CAP0.PREEDGE, CAP1.PREEDGE

General Information	
Type	R/W Parameter
Description	Selects the capture precondition edge.
Units	N/A
Range	1 to 3
Default Value	1
Data Type	U8
See Also	CAP0.EDGE, CAP1.EDGE
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3460h/7, 3460h/8
Data Type	Unsigned 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

The precondition edge is monitored for rising edge, falling edge, or both. The event mode logic may ignore the precondition edge detection (trigger always uses edge detection).

The filtered trigger source has an identical feature controlled by CAP0.EDGE, CAP1.EDGE.

Value	Description
0	Reserved
1	Rising edge
2	Falling edge
3	Both edges

CAP0.PREFILTER, CAP1.PREFILTER

General Information	
Type	R/W Parameter
Description	Sets the filter for the precondition input source.
Units	N/A
Range	0 to 2
Default Value	0
Data Type	U8
See Also	CAP0.FILTER, CAP1.FILTER
Start Version	M_0-0-50-0

Description

You can use an optional glitch filter to debounce the input trigger signals. By default the filter is disabled. A 0.6 us filter may be selected for fast signals such as RS422, or fast opto. A 40 us filter may be selected for slow opto inputs. Exact values for each filter mode are listed below.

Filter (if no glitch)	Trigger Filter (filter clock enable period)	Filter Delay (us)			
		Min	**Typ**	**Max**	
off	0	N/A	N/A	N/A	N/A
(default)	0	0	0	N/A	N/A
fast	1	0.56	0.6	0.64	0.80
slow	2	35.84	38.4	40.96	5.12

The filter uses seven stages of delay when enabled. An input glitch restarts the filter delay. The clock enable period for the seven-stage filter is set to 0.080 us for the fast filter, 5.12 us for the slow filter. The filter delay for a clean input edge is therefore an average of 7.5 periods (+/- 0.5 period for worst case).

CAP0.PRESELECT, CAP1.PRESELECT

General Information	
Type	R/W Parameter
Description	Sets the precondition trigger.
Units	N/A
Range	0 to 11
Default Value	0
Data Type	U8
See Also	CAP0.TRIGGER, CAP1.TRIGGER
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3460h/9, 3460h/10
Data Type	Unsigned 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

This parameter specifies the input signal for the precondition trigger.

Trigger Source	Input Name
0	General Input 1
1	General Input 2
2	General Input 3
3	General Input 4
4	General Input 5
5	General Input 6
6	General Input 7
7	RS485 Input 1
8	RS485 Input 2
9	RS485 Input 3
10	Primary Index
11	Tertiary Index

CAP0.STATE, CAP1.STATE

General Information	
Type	R/O Parameter
Description	Indicates whether or not trigger source was captured.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-50-0

Description

When enabling the capture (CAP0.EN, CAP1.EN), this parameter is set to 0 until the next event is captured.

0 = Not captured

1 = Captured

CAP0.T, CAP1.T

General Information	
Type	R/O Parameter
Description	Reads time capture (if time capture was configured).
Units	ns
Range	N/A
Default Value	N/A
Data Type	U32
See Also	CAP0.MODE, CAP1.MODE
Start Version	M_0-0-50-0

Description

If time capture was configured, the captured time is stored in this parameter. The reference time is the occurrence of the last MTS signal (recurring every 62.5 µs), so this is a purely drive internal time.

CAP0.TRIGGER, CAP1.TRIGGER

General Information	
Type	R/W Parameter
Description	Specifies the trigger source for the position capture.
Units	N/A
Range	0 to 11
Default Value	0
Data Type	U8
See Also	CAP0.PRESELECT, CAP1.PRESELECT
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3460h/1, 3460h/2
Data Type	Unsigned 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

This parameter specifies the trigger source (capture input signal).

Trigger Source	Input Name
0	General Input 1
1	General Input 2
2	General Input 3
3	General Input 4
4	General Input 5
5	General Input 6
6	General Input 7
7	RS485 Input 1
8	RS485 Input 2
9	RS485 Input 3
10	Primary Index
11	Tertiary Index

CS Parameters

Controlled stop (CS) parameters set the values for the controlled stop process.

CS.DEC

General Information	
Type	NV Parameter
Description	Sets the deceleration value for the controlled stop process.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s^2, (PIN/POUT)/s^2, rad/s^2 Linear: counts/s^2, mm/s^2, µm/s^2, (PIN/POUT)/s^2
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s^2 0.155 to 4,166,666.752 (PIN/POUT)/s^2 0.195 to 5,235,987.968 rad/s^2 Linear: 0.000 to 833.333 Counts/s^2 0.031*MOTOR.PITCH to 833333.333*MOTOR.PITCH mm/s^2 30.994*MOTOR.PITCH to 833333333.333*MOTOR.PITCH µm/s^2 0.155 to 4,166,666.667 (PIN/POUT)/s^2
Default Value	Rotary: 50.000 rps/s 3000.000 rpm/s 18,000.000 deg/s^2 250.000 (PIN/POUT)/s^2 314.159 rad/s^2 Linear: 0.050 Counts/s^2 50.000*MOTOR.PITCH mm/s^2 50000.000*MOTOR.PITCH µm/s^2 250.000 (PIN/POUT)/s^2
Data Type	Float
See Also	CS.VTHRESH, CS.TO, CS.STATE
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3440h/1
Data Type	Unsigned 32

Fieldbus Information	
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

This parameter sets the deceleration value for the controlled stop process.

See DRV.DISMODEfor more information about the controlled stop process.

CS.STATE

General Information	
Type	R/O Parameter
Description	Returns the internal status of the controlled stop process.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	CS.DEC, CS.VTHRESH, CS.TO
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3441h/0
Data Type	Unsigned 8
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

CS.STATE returns the internal state machine value of the controlled stop. See DRV.DISMODEfor more information about the controlled stop process.

CS.TMAX

General Information	
Type	NV Parameter
Description	Sets the time-out value for the drive to disable if velocity is not within CS.VTHRESH.
Units	ms
Range	1 to 30,000 ms
Default Value	1,000 ms
Data Type	Integer
See Also	CS.DEC, CS.VTHRESH, CS.TOCS.STATE
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	36DCh/0
Data Type	Integer 32
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

CS.TMAX is the time-out value for the drive to disable if velocity is not within CS.VTHRESH. See DRV.DI-SMODEfor more information about the controlled stop process.

Example

CS.TMAX 1000.

CS.TO

General Information	
Type	NV Parameter
Description	Sets the time value for the drive velocity to be within CS.VTHRESH.
Units	ms
Range	1 to 30,000 ms
Default Value	6 ms
Data Type	Integer
See Also	CS.DEC, CS.VTHRESH, CS.STATE
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3440h/3
Data Type	Unsigned 32
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

CS.TO is the time value for the drive velocity to be within CS.VTHRESH before the drive disables. See DRV.DISMODEfor more information about the controlled stop process.

Example

CS.TO 100

CS.VTHRESH

General Information	
Type	NV Parameter
Description	Sets the velocity threshold for the controlled stop.
Units	rpm, rps, deg/s, (PIN/POUT)/s
Range	0.001 to 200.000 rpm
Default Value	120 rpm
Data Type	Float
See Also	CS.DEC, CS.TO, CS.STATE
Start Version	M-0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3440h/2
Data Type	Unsigned 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

CS.VTHRESH is the velocity threshold for the controlled stop algorithm. See DRV.DISMODEfor more information about the controlled stop process.

Example

CS.VTHRESH 100

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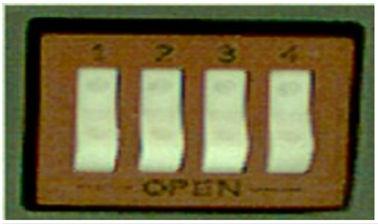
DIN Parameters

DIN.DIPSWITCH

General Information	
Type	R/O Parameter
Description	Reads the DIP switch positions.
Units	N/A
Range	0 to 15
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

DIN.DIPSWITCH reads the four DIP switch positions.

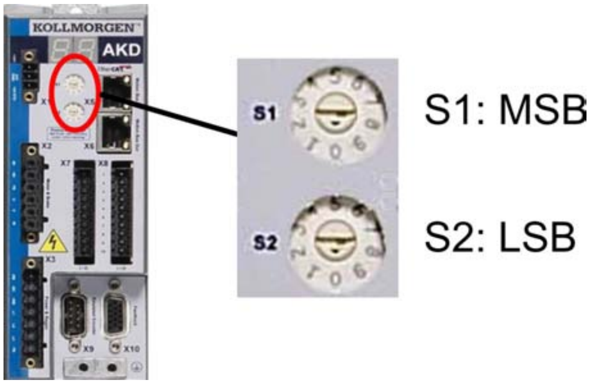


DIN.ROTARY

General Information	
Type	R/O Parameter
Description	Reads the rotary knob value.
Units	N/A
Range	0 to 99
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

DIN.ROTARY reads the rotary knob value.


KOLLMORGEN
AKD
S1
S1: MSB
S2
S2: LSB

DIN.STATES

General Information	
Type	R/O Parameter
Description	Reads the digital input states.
Units	N/A
Range	0000000 to 1111111
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DIN.STATES reads the states of the seven digital inputs. The leftmost bit represents digital input 1 (DIN1) and the rightmost bit represents digital input 7 (DIN7).

DIN1.INV TO DIN7.INV

General Information	
Type	R/W Parameter
Description	Sets the indicated the polarity of a digital input mode.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_00-00-51-000

Description

Sets the indicated the polarity of a digital input mode.

Example

DIN1.INV = 0 : Input is active high.

DIN1.INV = 1 : Input is active low.

DIN1.MODE TO DIN7.MODE

General Information	
Type	R/W Parameter
Description	Sets the digital input modes.
Units	N/A
Range	0 to 20
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	DIN1.MODE: 3562h/0 DIN2.MODE: 3565h/0 DIN3.MODE: 3568h/0 DIN4.MODE: 356Bh/0 DIN5.MODE: 36F6h/0 DIN6.MODE: 36F9h/0 DIN7.MODE: 36FCh/0
Data Type	Integer 32 (all)
PDO Mappable	No
Start Version	M_00-00-62-000

Description

DIN1.MODE to DIN7.MODE parameters set the functionality of the digital inputs 1 through 7. Digital inputs and corresponding X7 and X8 pin connectors are described in the AKD Installation Manual, section 8.16.4, Digital Inputs. The table below summarizes the digital input modes; detailed descriptions of each mode follow the table.

DINx.MODE	Description
0	No function; off
1	Fault reset
2	Start motion task (use DINx.PARAM for this task)
3	Motion task select bit
4	Motion task start selected
5	Start home
6	Start jog
7	Switch opmode
8	Zero latch
9	Reserved
10	Control fault relay
11	Home reference
13	Emergency stop

DINx.MODE	Description
15	Quick stop
16	Activate electronic gearing
17	Activate electronic gear position shift
18	Positive limit switch
19	Negative limit switch
20	Brake release

Mode 0: Off

This mode is the non-use state. The AKD defaults to this setting.

Mode 1: Fault Reset

This mode is used to clear the drive faults. A change in state causes the drive to reset faults. This mode will only correct non-fatal faults (see fault chart). Upon a rising edge a command, which is similar to DRV.CLRFAULTS, is issued and faults are cleared

Mode 2: Start Motion Task

This mode is used to start motion task number X. This input will trigger a motion task number as defined in the extra parameter field for this input.

X = the value of the associated input parameter.

It is assumed that motion task number X exists.

Example:

-->DIN1.MODE 2 - sets the input mode mode to be Start Motion Task

-->DIN1.PARAM 1 - sets the Motion Task to start to be 1

-->MT.LIST - make sure that Motion Task 1 does exist

1 0.000 [Counts] 1000.000 [rpm] 0 1001.358 [rpm/s] 1001.358 [rpm/s] 0 0 0 [ms]

<Create a rising edge of the input>

<Motion Task 1 executed>

Mode 3: Motion Task Select Bit

This mode is used to select the motion tasks that are stored in the drive (numbers 1 to 127) or the reference traverse/homing (0). The motion task number is presented externally at the digital inputs. The motion task set by this mode will be executed when digital input assigned to mode 4 (motion task start selected) gets a rising edge.

Example

Assume:

DIN1.MODE = DIN2.MODE

DIN3.MODE =3

The state of input 1 and 3 are 1

The state of input 2 is 0

that motion task 5 (2^0+2^2) will be executed.

Mode 4: Motion Task Start Selected

This mode is used to start the motion task that is stored in the servo amplifier, by giving the motion task number. This input utilizes a secondary variable for the motion task number to be started with the Input trigger. The secondary variable is set by mode 3 (Motion task select bit).

Motion task number “0” initiates homing/reference traverse. A rising edge starts the motion task and a falling edge cancels the motion task.

Mode 5: Start Motion Task Home

This mode is used to start the homing motion task on the rising edge. The falling edge has no effect on this input mode of operation.

Mode 6: Start Jog

This mode is used to start a jog move. This input mode utilizes a secondary variable for the jog’s velocity. The jog will start upon a rising edge. A falling edge stops the jog.

Mode 7: Switch Opmode

This mode is used to switch between two pre-defined drive operation modes (current, velocity, position). This input mode utilizes a secondary variable used to set the predefined opmodes to switch between the modes.

The secondary variable holds the value of 2 opmodes.

The tens digit holds the opmode to switch to upon falling edge.

The units digit holds the opmode to switch to upon rising edge.

For example:

> If you need the opmode on falling edge to be 1 and the opmode on rising edge to be 2, then you would set DINx.PARAM 12.

DINx.PARAM is shown in Workbench in the **Digital Inputs and Outputs** screen as the parameter "Param" just to the right of the **Mode** combination box.

Mode 8 – Zero Latch

This mode is used to define the current drive position as the zero pulse for the drive EEO and sets the incremental encoder zero pulse offset. The current position, depending on the incremental encoder resolution that is set, is calculated at the rising edge and stored as an offset. An automatic save is then generated. This function is used to perform an automatic setting of the zero pulse in one turn of the motor.

Mode 9: Reserved

Mode 10: Control Fault Relay

This mode is used to create an external fault.

Input state is 0 – drive regular behavior

Input state is 1 – “Fault 245 – external fault” is issued.

Mode 11: Home reference

This mode is used to receive a physical home reference switch located on the machine to use for the different Home Types.

Mode 12: Position Latch

The input latches the actual current position. The position can then be read in a stored variable.

The stored variable can be read by issuing the command CAP0.PLFB. (The command CAP0.EN 1 must be issued prior to this)

Mode 13: Emergency Stop

This mode is used to stop the motor using the deceleration variable ramp. If zero velocity is reached, the power stage is then disabled. Also see CS.XXX commands.

Mode 14: Reserved

Mode 15: Quick Stop

This mode is used to stop the motor. It is equivalent to issuing a DRV.STOP command.

Mode 16: Activate Electronic Gearing

This mode starts/activates an electronic gearing procedure upon a rising edge.

Mode 17: Activate Electronic Gear Position Shift

This mode is used to add a difference velocity to the gearing upon a rising edge. The velocity to add is set by a secondary variable. The secondary variable is set by DINx.PARAM.

Mode 18: Positive Limit Switch

This mode will cause the input to operate as the CW limit switch. If the CW limit switch input is triggered (goes low), the CW (positive) direction motion will then be stopped.

Mode 19: Negative Limit Switch

This mode will cause the input to operate as the CCW limit switch. If the CCW limit switch input is triggered (goes low), the CCW (negative) direction motion will then be stopped.

Mode 20: Brake Release

This mode is used to lift the brake when the drive is not active.

Input = 0: the drive controls the brake (regular drives behavior)

Input = 1: the user controls the brake (lift or close using commands)

DIN1.PARAM TO DIN7.PARAM

General Information	
Type	R/W Parameter
Description	Sets a value used as an extra parameter for digital inputs nodes.
Units	N/A
Range	-9,223,372,036,854,775,000 to +9,223,372,036,854,775,000
Default Value	0
Data Type	Float
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter sets a value that is used as an extra parameter for digital inputs nodes.

Example

The digital input mode "Start motion task" is used to start a motion task. This mode uses an extra parameter as the ID of the motion task to be started.

DIN1.STATE to DIN7.STATE

General Information	
Type	R/O Parameter
Description	Reads a specific digital input state.
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-15

Description

DIN1.STATE to DIN7.STATE reads the state of one digital input according to the number identified in the command.

DOUT Parameters

DOUT.CTRL

General Information	
Type	NV Parameter
Description	Sets the source of digital outputs (firmware or fieldbus).
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-15

Description

DOUT.CTRL sets the source of the digital outputs:

0 = Firmware controlled

1 = Fieldbus controlled

DOUT.RELAYMODE

General Information	
Type	R/W Parameter
Description	Indicates faults relay mode.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_00-00-51-000

Description

DOUT.RELAYMODE indicates the faults relay mode as follows:

If DOUT.RELAYMODE= 0 and faults exist, then the relay is open.
If DOUT.RELAYMODE= 0 and faults do not exist - relay closed.

If DOUT.RELAYMODE = 1 and the drive is disabled, then the relay is open.
If DOUT.RELAYMODE = 1 and the drive is enabled, then the relay is closed.

DOUT.STATES

General Information	
Type	R/O Parameter
Description	Reads the state of the two digital outputs.
Units	N/A
Range	0 to 11
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DOUT.STATES reads the states of the two digital outputs. The rightmost bit represents DOUT2 and the left-most bit represents DOUT1.

DOUTx.MODE

General Information	
Type	NV Parameter
Description	Sets the digital output mode.
Units	N/A
Range	0 to 11
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

DOUTx.MODE sets the functionality of the digital outputs. The table below summarizes the digital output modes; detailed descriptions of each mode follow the table.

DOUTx.MODE	Description
0	User (default = 0)
2	Software limit switch reached
3	Move complete
4	In position
5	Position greater than x
6	Position less than x
7	Drive produced warning
8	Drive enabled
10	Motor brake
11	Drive produced fault
12	Absolute velocity greater than x
13	Absolute velocity less than x

Mode 0: User

The output state is decided by user or fieldbus.

Mode 1: Reserved

Mode 2: Software limit

This output mode produces a high signal if a software limit-switch is reached. A move or motion task in the opposite direction resets the output.

Mode 3: Move complete

This output mode produces a high signal if a position move is completed.

Mode 4: In position

This output mode produces a high signal when the absolute value of the position error in less than a variable x.

Use DOUTx.PARAM to set x.

Mode 5: Position greater than x

This output mode produces a high-signal if a position value exceeds the variable x.
Use DOUTx.PARAM to set x.

Mode 6: Position less than x

This output mode produces a high signal if a position value is less than the variable x. Use DOUTx.PARAM to set x.

Mode 7: Warning

The output mode produces a high signal if the drive has a warning.

Mode 8: Enable

The output mode produces a high signal if the drive is enabled.

Mode 9: Reserved

Mode 10: Motor Brake

The output mode produces a high signal if a brake is disengaged. The output mode produces a low if a brake is engaged.

Mode 11: Drive Faults

The output mode produces a high signal if the drive has a fault.

DOUT1.PARAM AND DOUT2.PARAM

General Information	
Type	NV Parameter
Description	Sets extra parameters for the digital outputs.
Units	N/A
Range	–9,223,372,036,854,775,808 to +9,223,372,036,854,775,807
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

DOUT1.PARAM and DOUT2.PARAM set the extra parameter needed for the digital outputs calculations, respectively.

DOUT1.STATE AND DOUT2.STATE

General Information	
Type	R/O Parameter
Description	Reads the digital output state.
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-15

Description

DOUT1.STATE and DOUT2.STATE read the state of one digital output according to the value stated in the command. These parameters can also be used to set a value of one digital output (only if the output mode is idle).

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DRV Parameters and Commands

DRV.ACC

General Information	
Type	NV Parameter
Description	Describes the acceleration ramp for the velocity loop.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s², (PIN/POUT)/s² , rad/s² Linear: counts/s² , mm/s² , µm/s² , (PIN/POUT)/s²
Range	Rotary: 0.031 to 833333.333 rps/s 1.860 to 50000000.000 rpm/s 11.158 to 300000000.000 deg/s² 0.155 to 4166666.752 (PIN/POUT)/s² 0.195 to 5235987.968 rad/s² Linear: 0.000 to 833.333 counts/s² 0.031*MOTOR.PITCH to 833333.333*MOTOR.PITCH mm/s² 30.994*MOTOR.PITCH to 833333333.333*MOTOR.PITCH µm/s² 0.155 to 4166666.667 (PIN/POUT)/s²
Default Value	Rotary: 50.000 rps/s 3000.000 rpm/s 18,000.000 deg/s² 250.000 (PIN/POUT)/s² 314.159 rad/s² Linear: 0.050 counts/s² 1.000*MOTOR.PITCH mm/s² 1000.000*MOTOR.PITCH µm/s² 250.000 (PIN/POUT)/s²
Data Type	Float
See Also	DRV.DEC, UNIT.ACCLINEAR, UNIT.ACCROTARY
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3501h/0
Data Type	Integer 32

Fieldbus Information	
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

Describes the acceleration ramp for the velocity central loop.

DRV.ACTIVE

General Information	
Type	R/O Parameter
Description	Reads the enable status of an axis.
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Boolean
See Also	DRV.EN,DRV.DISSOURCES
Start Version	M_0-0-15

Description

DRV.ACTIVE reads the enable status of an axis.

0 = Axis disabled

1 = Axis enabled.

If an axis is not enabled (DRV.ACTIVE is 0), but DRV.EN is 1 and the hardware enable is high, read the value of DRV.DISSOURCES to query the reason that the drive is not enabled.

DRV.BLINKDISPLAY

General Information	
Type	Command
Description	Causes the display to blink for 10 seconds.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-15

Description

DRV.BLINKDISPLAY causes the drive display located on the front of the drive to blink for 10 seconds. This command allows the user to identify the drive that is currently communicating with WorkBench.

DRV.CLRFAULTHIST

General Information	
Type	Command
Description	Clears the fault history log in the NV.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.FAULTHIST
Start Version	M_0-0-15

Description

DRV.CLRFAULTHIST clears the fault history from the nonvolatile memory of the drive.

This command erases all faults returned by DRV.FAULTHIST.

DRV.CLRFAULTS

General Information	
Type	Command
Description	Tries to clear all active faults in the drive.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.FAULTS, DRV.EN, DRV.DIS
Start Version	M_0-0-15

Description

DRV.CLRFAULTS tries to clear all active faults in the drive. If the command succeeds, then the reply to DRV.FAULTS states that no faults exist. If the command fails, then the fault condition is still present.

When a fault occurs, the fault is registered in the drive fault handler. DRV.CLRFAULTS clears the fault from the drive fault handler. However, if the fault still exists in the system, DRV.CLRFAULTS fails and the fault is re-registered in the fault handler.

Note that executing a drive disable (DRV.DIS) followed by a drive enable (DRV.EN) has the same effect as executing DRV.CLRFAULTS.

DRV.CMDSOURCE

General Information	
Type	NV Parameter
Description	Sets the command source (service, fieldbus, analog input, gearing, digital, or Bode).
Units	N/A
Range	0 to 3
Default Value	0
Data Type	Integer
See Also	DRV.OPMODE
Start Version	M_0-0-15

Description

DRV.CMDSOURCE specifies the source of the command to the drive. DRV.OPMODE sets the operation mode to the relevant control loop.

The DRV.CMDSOURCE values can be set as follows:

Value	Description
0	TCP/IP command
1	Fieldbus command
2	Gearing command
3	Analog command
4	Digital command
5	Sine-sweep Bode plot command

Example

To set the command source to the TCP/IP channel and the operation mode to velocity:

```
-->DRV.CMDSOURCE 0

-->DRV.OPMODE 1
```

DRV.CRASHDUMP

General Information	
Type	Command
Description	Retrieves diagnostic information after the drive crashes.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-50-0

Description

Drives rarely crash, but if a crash occurs, information that can help diagnose the cause of a crash is saved to the nonvolatile (NV) memory within the drive. After the drive is restarted, you can use the DRV.CRASHDUMP command to retrieve this diagnostic information, which can be emailed to Kollmorgen for further support.

If the drive crashes (display flashes an F and three bars), it saves the diagnostic information to a specific block of the drive NV memory. The DRV.CRASHDUMP command then prints the diagnostic information from this NV memory block. Subsequent crash conditions will overwrite the NV memory block. Since the NV memory block is overwritten, but never erased, the DRV.CRASHDUMP command always shows the diagnostic information for the most recent crash.

DRV.DBILIMIT

General Information	
Type	NV Parameter
Description	Sets the maximum amplitude of the current for dynamic braking.
Units	Arms
Range	0 to 2 Arms
Default Value	1 Arms
Data Type	Float
See Also	DRV.DISMODE
Start Version	M-0-0-50

Description

This parameter sets the maximum amplitude of the current for dynamic braking.

Example

Setting DRV.DBILIMIT to 2 limits the dynamic brake current to 2 Arms.

DRV.DEC

General Information	
Type	NV Parameter
Description	Sets the deceleration value for the velocity loop.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s², (PIN/POUT)/s², rad/s² Linear: counts/s², mm/s², µm/s², (PIN/POUT)/s²
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s² 0.155 to 4,166,666.752 (PIN/POUT)/s² 0.195 to 5,235,987.968 rad/s² Linear: 0.000 to 833.333 counts/s² 0.031*MOTOR.PITCH to 833,333.333*MOTOR.PITCH mm/s² 30.994*MOTOR.PITCH to 833,333,333.333*MOTOR.PITCH µm/s² 0.155 to 4,166,666.667 (PIN/POUT)/s²
Default Value	Rotary: 50.000 rps/s 3,000.000 rpm/s 18,000.000 deg/s² 250.000 (PIN/POUT)/s² 314.159 rad/s² Linear: 0.050 counts/s² 1.000*MOTOR.PITCH mm/s² 1,000.000*MOTOR.PITCH µm/s² 250.000 (PIN/POUT)/s²
Data Type	Float
See Also	DRV.ACC, UNIT.ACCROTARY, UNIT.ACCLINEAR, DRV.OPMODE
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3522h/0
Data Type	Integer 32
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

DRV.DEC sets the deceleration value for the velocity loop command (VL.CMDU) and for the analog velocity command (AIN.VALUE). The operation mode (DRV.OPMODE) must be set to velocity mode for this command to function.

DRV.DIR

General Information	
Type	R/W Parameter
Description	Changes drive direction.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-38

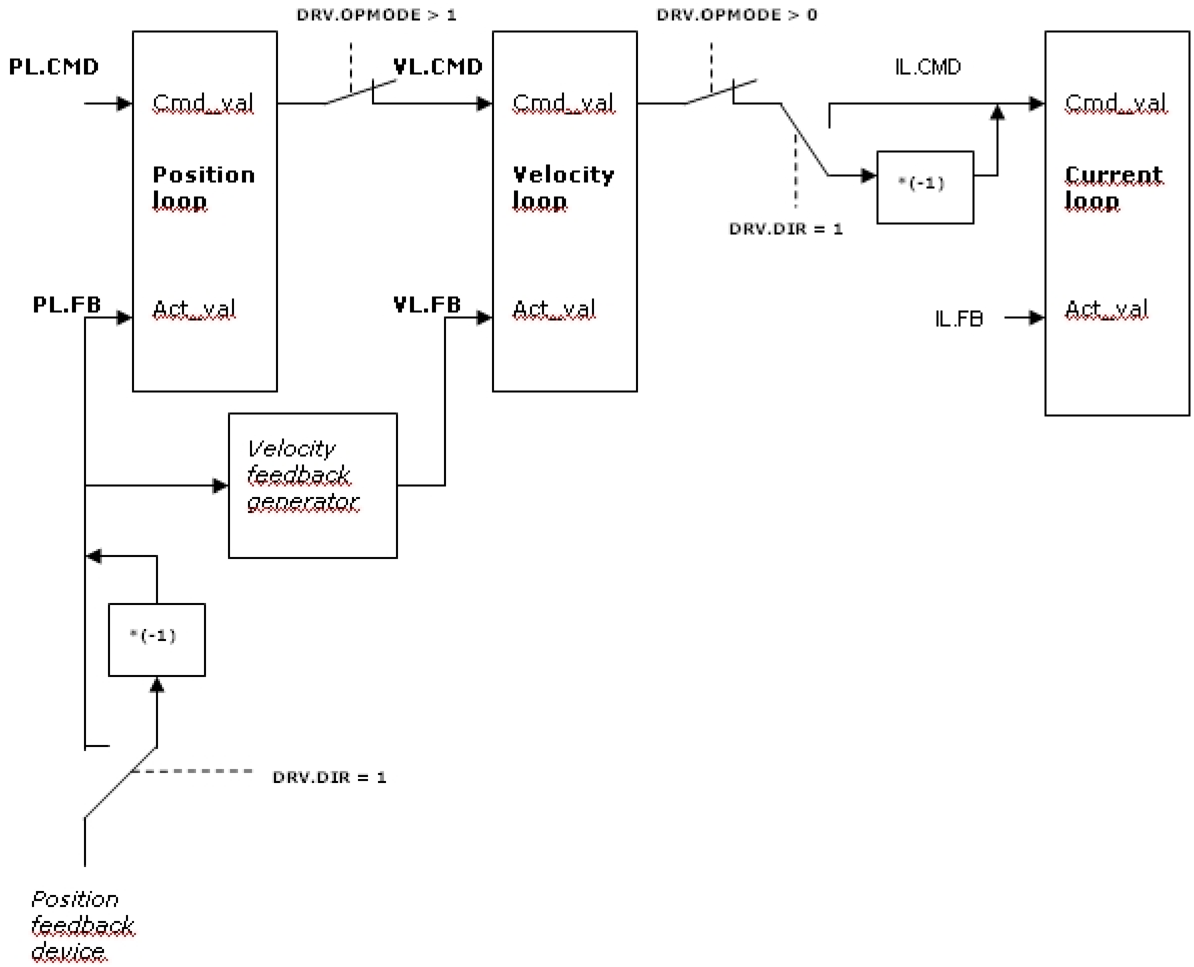
Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	352Ah/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

DRV.DIR changes the direction of the motor by changing the algebraic sign of the current command and position feedback value according to the figure below.

Note the following when using DRV.DIR:

- You can only change the DRV.DIR command when the drive is disabled.
- The drive status changes to "Axis not homed" as soon as the DRV.DIR parameter changes value (see DRV.MOTIONSTAT).
- You must verify the settings of the hardware limit switches. If necessary, switch the CW and CCW hardware limit switches by swapping the wires at the digital inputs.


DRV.OPMODE > 1
DRV.OPMODE > 0
PL.CMD
VL.CMD
IL.CMD
Cmd_val
Position loop
Act_val
Cmd_val
Velocity loop
Act_val
Cmd_val
Current loop
Act_val
*(-1)
DRV.DIR = 1
PL.FB
VL.FB
IL.FB
Velocity feedback generator
*(-1)
DRV.DIR = 1
Position feedback device

DRV.DIS

General Information	
Type	Command
Description	Disables the axis (software).
Units	N/A
Range	N/A
Default Value	Analog drive software enabled. All other types of drive software disabled.
Data Type	N/A
See Also	DRV.EN, DRV.DISSOURCES, DRV.ACTIVE, DRV.DISMODE, DRV.DISTO
Start Version	M_0-0-15

Description

DRV.DIS issues a software disable to the drive. The method how the drive will be disabled, immediately or with a ramp down first is controlled by DRV.DISMODE!

By querying the value of DRV.ACTIVE, you can check whether the drive is currently enabled or disabled.

By querying the value of DRV.DISINPUTS, you can check whether the software enable bit is high (software enabled was issued by executing DRV.EN) or the software enable bit is low (software disable was issued by executing DRV.DIS)

If DRV.DIS is commanded the emergency timeout is started. If the drive does not disable or activate dynamic brake within DRV.DISTO, the fault F703 is reported.

DRV.DISMODE

General Information	
Type	NV Parameter
Description	Sets disable type to either dynamic brake or immediate disable.
Units	NA
Range	0 to 3
Default Value	0
Data Type	Integer
See Also	DRV.DBILIMIT ,DRV.DISTO, CS.VTHRESH
Start Version	M-0-0-50

Description

Sets the drive reaction a DRV.DIS command.

Example

DRV.DISMODE 0 - Disable axis immediately.

Be careful with vertical loads

DRV.DISMODE 1 - Use dynamic brake to ramp down. PWM stays active afterwards.

DRV.DISMODE 2 - Use active disable to ramp down and then disable the drive.

DRV.DISMODE 3 - Use active disable to ramp down and use dynamic brake afterwards . PWM stays enabled.

In all cases described above, if a brake is configured (MOTOR.BRAKE), the brake closes if VL.FB drops below CS.VTHRESH.

For more information about active disable, please consult the CS.x parameters.

DRV.DISSOURCES

General Information	
Type	R/O Parameter
Description	Returns the possible reason for a drive disable.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.ACTIVE, DRV.FAULTS, DRV.EN, DRV.DIS
Start Version	M_0-0-15

Description

DRV.DISSOURCES is a bitwise parameter that returns the status of possible causes of a drive disable. If this parameter is 0, then the drive is enabled, but the software is disabled.

The return value specific bits are as follows:

Bit	Status and Response
0	Software disable (execute DRV.EN to issue software enable)
1	Fault exists (read DRV.FAULTS to get the active faults)
2	Hardware disable (remote enable input is low)
3	In-rush disable (the in-rush relay is opened)
4	Initialization disable (the drive did not finish the initialization process)
5	Controlled stop disable from a digital input.

DRV.DISTO

General Information	
Type	R/W Parameter
Description	Sets the emergency timeout
Units	ms
Range	500 to 120,000 ms
Default Value	1,000 ms
Data Type	U32
See Also	DRV.DIS, DRV.DISMODE
Start Version	M-0-0-55

Description

This timer starts when DRV.DIS is issued (regardless of the DRV.DIS origin). After this timeout elapses, the actual state of the drive is compared to the DRV.DISMODE setting. If the actual state does not match the DRV.DISMODE setting, a fault is reported and the hardware immediately executes the DRV.DISMODE setting (for instance, disable or activate dynamic brake).

DRV.EMUEDIR

General Information	
Type	R/W Parameter
Description	Sets the direction of the emulated encoder output (EEO) signal.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	N/A
See Also	DRV.EMUEMODE
Start Version	M_0-0-59

Description

Allows the user to change the direction of the emulated encoder output. DRV.DIR has also an affect on the this direction (it is XORed with this parameter).

DRV.EMUEMODE

General Information	
Type	R/W Parameter
Description	Sets the mode of the emulated encoder output (EEO) connector.
Units	N/A
Range	0 to 5
Default Value	0
Data Type	Integer
See Also	DRV.EMUERES, DRV.EMUEZOFFSET, DRV.EMUEMTURN
Start Version	M_0-0-50-0

Description

This parameter sets the EEO connector to act as either an input or output as follows:

Setting	Function
0	EEO connector is not operative.
1	Output, with once per rev index pulse.
2	Output, with absolute index pulse.
3	Input, A/B signals.
4	Input, step and direction signals.
5	Input, up-down signals.

DRV.EMUEMTURN

General Information	
Type	R/W Parameter
Description	Defines the location of the index pulse on the EEO (emulated encoder output) when DRV.EMUEMODE=2.
Units	counts
Range	0 to 4,294,967,295
Default Value	0
Data Type	Integer
See Also	DRV.EMUEMODE, DRV.EMUERES
Start Version	M_0-0-50-0

Description

If the EEO mode with absolute index is selected (DRV.EMUEMODE=2), the index will be output when the feedback position (in counts) matches this parameter.

DRV.EMUERES

General Information	
Type	R/W Parameter
Description	Sets the resolution of the EEO (emulated encoder output).
Units	Lines per revolution
Range	0 to 65,535 lines per revolution
Default Value	0 lines per revolution
Data Type	Integer
See Also	DRV.EMUEMODE
Start Version	M_0-0-50-0

Description

This parameter sets the EEO resolution. DRV.EMUERES also defines how many lines are output for 1 revolution of the primary feedback (when this port is configured as an output), or how many lines will be considered a full revolution of the handwheel (when this port is configured as an input).

DRV.EMUEZOFFSET

General Information	
Type	R/W Parameter
Description	Sets the location of the EEO (emulated encoder output) index pulse (when DRV.EMUEMODE=1).
Units	1/65536 rev
Range	0 to 65535 rev
Default Value	0 rev
Data Type	Integer
See Also	DRV.EMUEMODE, DRV.EMUEMTURN
Start Version	M_0-0-50-0

Description

When EEO multiturn is selected (DRV.EMUEMODE=1), this parameter sets a position of the EEO index. When the primary feedback position (within a revolution) equals this value, an index pulse will output.

DRV.EN

General Information	
Type	Command
Description	Enables the axis (software).
Units	N/A
Range	N/A
Default Value	Analog drive software is enabled. All other types of drive software are disabled.
Data Type	N/A
See Also	DRV.DIS, DRV.DISSOURCES DRV.ACTIVE
Start Version	M_0-0-15

Description

DRV.EN issues a software enable to the drive. You can query the value of DRV.ACTIVE to check whether the drive is currently enabled or disabled.

You can also query the value of DRV.DISSOURCES to check whether the software enable bit is high (software enabled was issued by executing DRV.EN) or the software enable bit is low (software disable was issued by executing DRV.DIS). If the drive software enable bit is low and DRV.EN is executed, then drive faults are automatically cleared during the software enable process.

DRV.ENDEFAULT

General Information	
Type	R/W Parameter
Description	Sets the default state of the software enable
Units	N/A
Range	0-SWEN=0 to 1-SWEN=1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M-0-30-00

Description

DRV.ENDEFAULT sets the default state of the software enable.

DRV.FAULTHIST

General Information	
Type	R/O Parameter
Description	Reads the last 10 faults from NV memory.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.FAULTS, DRV.CLRFAULTHIST
Start Version	M_0-0-15

Description

DRV.FAULTHISTORY returns the last 10 faults that occurred in the drive. The faults are shown with their fault number (which matches the one displayed on the drive display) and a time stamp that indicates when they last occurred.

Issue a DRV.CLRFAULTHIST to clear this fault log.

DRV.FAULTS

General Information	
Type	R/O Parameter
Description	Reads the active faults.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.CLRFAULTS, DRV.FAULTHIST, DRV.CLRFAULTHIST
Start Version	M_0-0-15

Description

DRV.FAULTS returns a list of all currently active faults in the system, preceded by their fault number which matches the number displayed on the drive display.

To clear the faults, either issue a DRV.CLRFAULTS or issue a DRV.DIS followed by DRV.EN.

If no active faults are in the system, then after executing DRV.CLRFAULTS the value read by DRV.FAULTS is "No faults active".

Example

```
-->DRV.FAULTS

502: Bus under voltage.

-->
```

DRV.HANDWHEEL

General Information	
Type	R/O Parameter
Description	Reads the EEO input value.
Units	1/4,294,967,296 rev
Range	0 to 4,294,967,295 rev
Default Value	0 rev
Data Type	Integer
See Also	DRV.EMUERES, DRV.EMUEMODE
Start Version	M_0-0-50-0

Description

When the EEO is selected as an input (DRV.EMUEMODE=3,4,5), this parameter reads the EEO value (where 4,294,967,296 is a full revolution, then the value rolls over). DRV.EMUERES defines the how many counts constitute a revolution on the EEO.

DRV.HELP

General Information	
Type	R/O Parameter
Description	Reads the minimum, maximum, and default values for a specific parameter or command.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-15

Description

This parameter returns more information about a specific parameter or command.

In most cases, except special parameters, this command tells you the minimum, maximum, default, and actual value of a parameter. Exceptions are commands that do not have these values (such as DRV.EN) or information commands (such as DRV.VER).

DRV.HELPALL

General Information	
Type	R/O Parameter
Description	Retrieves the minimum, maximum, default, and actual values for all available parameters and commands.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0_0_38

Description

This parameter retrieves all information about all parameters and commands in the firmware. In most cases, DRV.HELPALL returns the minimum, maximum, default, and actual value for each parameter and command. Exceptions include parameters and commands that do not have these values (such as DRV.EN) or pure INFO commands (such as DRV.VER).

DRV.ICONT

General Information	
Type	R/O Parameter
Description	Reads the continuous rated current value.
Units	A
Range	N/A
Default Value	N/A
Data Type	Float
See Also	DRV.IPEAK
Start Version	M_0-0-15

Description

DRV.ICONT returns the drive continuous rated current in amperes.

The value of the continuous current is read automatically on drive boot from the power EEPROM of the drive. This value cannot be modified.

DRV.INFO

General Information	
Type	R/O Parameter
Description	Reads general information about the drive.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DRV.INFO returns general information about the drive.

Example

```
Danaher Motion - Digital Servo Drive

----------------------------------------------------------------------

Drive mode                        : AKD-B00606-NAAN-0000

Continuous current                   : 12.000 A

Peak current: 30.000 A

Mac address: 00.23.1B.00.00.16

FPGA size: 1600

Fieldbus type: Analog

Power type                            : MV - Medium Voltage

Product serial number: 16777215

Product manufacturing date code  : 65535

Power board serial number             : 0

Power board manufacturing date code: 0

Control board serial number: 0

Control board manufacturing date code: 0

Option board serial number: 0

Option board manufacturing date code: 0
```

DRV.IPEAK

General Information	
Type	R/O Parameter
Description	Reads the peak rated current value.
Units	A
Range	N/A
Default Value	N/A
Data Type	Float
See Also	DRV.ICONT
Start Version	M_0-0-15

Description

DRV.IPEAK returns the drive peak rated current in amperes.

The value of the peak current is read automatically on drive boot from the power EEPROM of the drive. This value cannot be modified.

DRV.IZERO

General Information	
Type	R/W Parameter
Description	Sets the current that will be used during the DRV.ZERO procedure.
Units	A
Range	Drive peak current to 0 A
Default Value	0 A
Data Type	Float
See Also	DRV.ZERO
Start Version	M_0-0-50-0

Description

This parameter sets the current that is used during the DRV.ZERO procedure.

DRV.LIST

General Information	
Type	R/O Parameter
Description	Reads the list of available parameters and commands.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DRV.LIST reads the list of available commands and parameters from the drive.

To filter this list, enter DRV.LIST followed by the prefix of the commands and parameters that you wish to display.

Example

Return a list of all available commands in the system:

```
-->DRV.LIST
```

Return all commands with the prefix DRV:

```
-->DRV.LIST DRV
```

DRV.LOGICVOLTS

General Information	
Type	R/O Parameter
Description	Reads the logic voltages.
Units	mv , Ω
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DRV.LOGICVOLTS reads the logic voltages data of 1.2 V, 2.5 V, 3.3 V, 5 V, 12 V, –12 V, and 3.3 AV.

Example

Below is an example of the output for this command:

```
ch0 = 1.2V    : 1211 mv

ch1 = 2.5V      :2488 mv

ch2 = 3.3V      :3274 mv
```

```
ch3 = 5V        :4950 mv
ch4 = 12V    :11892 mv
ch5 = -12V    :-11912 mv
ch6 = 3.3AV   :3300 mv
ch7 = R ohm   :100000 ohm
```

DRV.MEMADDR

General Information	
Type	R/W Parameter
Description	Sets the read and write address.
Units	N/A
Range	N/A
Default Value	1.U8
Data Type	N/A
See Also	DRV.MEMDATA
Start Version	M_0-0-14

Description

DRV.MEMADDR sets the address that is used by DRV.MEMDATA. The input can be either an internal parameter of the drive or any direct address from the DSP address space (SDRAM, internal RAM, or asynchronous memory). The input value can be either decimal or hexadecimal with 0x prefix.

Type extension can be one of the following:

U8,S8,U16,S16,U32,S32,U64,S64.

Examples

Setting to an internal parameter:

```
-->DRV.MEMADDR CCommandHandler.Debug1
```

Setting to an internal address:

```
-->DRV.MEMADDR 0xffabcde.u16
```

DRV.MEMDATA

General Information	
Type	R/W Parameter
Description	Sets or reads a value from an internal address.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.MEMADDR
Start Version	M_0-0-14

Description

DRV.MEMDATA reads a value from the address that was set by DRV.MEMADDR or writes a value to this address. The input value can be either decimal or hexadecimal with 0x prefix.

Examples

Read a value from internal address:

```
-->DRV.MEMDATA 01
```

Write a hexadecimal value to an internal address:

```
-->DRV.MEMADDR 0x01
```

DRV.MOTIONSTAT

General Information	
Type	R/O Parameter
Description	Reads the motion status of the drive.
Units	N/A
Range	0 to 4,294,967,295
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

This command indicates the current status of the drive internal motion (see table below).

Bit	Significance	Description
0	0x00000001	Motion task is active (high active)
1	0x00000002	Home position found /reference point set (high active)
2	0x00000004	Homing finished (high active)
3	0x00000008	Homing active (high active)
4	0x00000010	Homing error condition has occurred (high active)*
5	0x00000020	Slave in electronic gearing mode synchronized (high active)
6	0x00000040	Electronic gearing is active (high active)
7	0x00000080	Emergency stop procedure in progress (high active)
8	0x00000100	Emergency stop procedure has an error (high active)
9	0x00000200	Service motion active (high active)
10	0x00000400	A motion task could not be activated /invalid MT (high active)**
11	0x00000800	Motion task target position has been reached. See also MT.TPOSWND (high active).
12	0x00001000	Motion task target velocity has been reached. See also MT.TVELWND (high active).
13	0x00002000	The bode plot procedure within the drive is active (high active).
14	0x00004000	The target position of a motion task has been crossed. This situation occurs for motion tasks with a change on the fly when triggering the DRV.STOP command just before the reaching the target velocity of the current active motion task. The ramp-down procedure with the motion task deceleration ramp causes the target position to be crossed (high active).

* A possible error condition for homing to a reference switch could be that no reference switch was found between two hardware limit switches.

** A possible error condition for an invalid motion task could be that a motion task tried to trigger automatically following motion task that has never been initialized (called an "empty motion" task).

Drive Name: DRV.NAME

General Information	
Type	NV Parameter
Description	Sets and reads the name of the drive.
Units	N/A
Range	N/A
Default Value	No-Name
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

You can assign a unique name to any AKD drive. This name is one way to identify the drive in a multiple drive network (for instance, in a TCP/IP network on which multiple drives reside).

From the terminal screen, DRV.NAME returns the name of the drive as ASCII characters.

DRV.NVLIST

General Information	
Type	R/O Parameter
Description	Lists the NV parameters and values from the RAM.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-15

Description

DRV.NVLIST lists all the drive parameters that reside in NV memory.

The list includes each parameter name, followed by its current value from the RAM.

DRV.NVLOAD

General Information	
Type	W/O Parameter
Description	Loads all data from the NV memory of the drive into the RAM parameters.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.NVLOAD DRV.NVLIST
Start Version	M_00-00-62-000

Description

DRV.NVLOAD loads all data from the NV memory of the drive into the RAM parameters.

DRV.NVSAVE

General Information	
Type	Command
Description	Saves the drive parameters from the RAM to the NV.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	DRV.RSTVAR
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	1010h/1
Data Type	Unsigned 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

DRV.NVSAVE saves the current drive parameter values from the RAM to the NV memory.

The drive parameters that were saved to the NV are read from the NV on the next drive boot, causing the values to be automatically set to the saved values on every drive boot.

Executing DRV.RSTVAR does not modify the values of the NV, but instead sets the drive values in RAM to their defaults.

DRV.ONTIME

General Information	
Type	R/O Parameter
Description	Returns how long the drive has been running since last power up.
Units	Days:Hours:Minutes:Seconds
Range	N/A
Default Value	N/A
Data Type	String
See Also	Returns how long the drive has been running since first activated.
Start Version	M_0-0-59

Description

Returns how long the drive has been running since last power up.

DRV.OPMODE

General Information	
Type	NV Parameter
Description	Sets the operation mode (current, velocity, or position).
Units	N/A
Range	0 to 2
Default Value	0
Data Type	Integer
See Also	DRV.CMDSOURCE
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35B4h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

DRV.OPMODE specifies the operation mode of the drive.

The operation mode values can be set as follows:

Mode	Description
0	Current (torque) operation mode
1	Velocity operation mode
2	Position operation mode

You must also use DRV.CMDSOURCE to set the source of the command to the drive.

Example

Set the source of the command to a TCP/IP channel and the desired operation mode to velocity:

```
-->DRV.CMDSOURCE 0

-->DRV.OPMODE 1
```

DRV.READFORMAT

General Information	
Type	R/W Parameter
Description	Sets the value returned to either decimal or hexadecimal.
Units	N/A
Range	10 or 16
Default Value	10
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

DRV.READFORMAT sets the return values type to either decimal or hexadecimal.

Format	Description
10	Sets the read values to decimal format
16	Sets the read values to hexadecimal format

DRV.RSTVAR

General Information	
Type	Command
Description	Sets default values in the drive without re-booting the drive and without resetting the NV memory.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	
Start Version	M_0-0-15

Description

DRV.RSTVAR causes the drive to return to the default values without the need to re-boot the drive first and without resetting the NV memory. Use DRV.RSTVAR to return to the default settings and recover a working drive.

DRV.RUNTIME

General Information	
Type	R/O Parameter
Description	Returns how long the drive has been running since first activated.
Units	Days:Hours:Minutes:Seconds
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DRV.RUNTIME returns how long the drive has been running since first activated. This is not only the current session but the total amount of time from all sessions.

DRV.STOP

General Information	
Type	Command
Description	This command stops all drive motion.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35FEh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This command stops all drive motion.

DRV.TEMPERATURES

General Information	
Type	R/O Parameter
Description	Reads the temperature of drive components.
Units	°C
Range	55 to 125 °C
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3413h/0
Data Type	Unsigned 16
PDO Mappable	No
Start Version	

Description

DRV.TEMPERATURES reads the temperature in different parts of the drive (power and control boards). The temperature is read from temperature sensors located in the drive.

Example

Below is an example of the output for this command :

```
Control Temperature: 39 °C
Power1  Temperature: 31 °C
Power2  Temperature: Sensor does not exist.
Power3  Temperature: Sensor does not exist.
```

DRV.VER

General Information	
Type	R/O Parameter
Description	Reads the drive version.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DRV.VER reads both FPGA and firmware versions.

The version data presented is hard coded in the firmware code.

Example

Below is an example of the output for this command:

```
Danaher Motion - Digital Servo Drive

-------------------------------------

FPGA version : FP0004_0001_00_07

Firmware Version : M_0-0-15_T_2009-01-19_10-36-28_IR
```

DRV.VERIMAGE

General Information	
Type	R/O Parameter
Description	Returns the version data from each image.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

DRV.VERIMAGE reads the versions of the different images in the drive. This parameter returns the version data from each image .i00 file.

Example

Below is an example of the output for this parameter:

```
Danaher Motion - Digital Servo Drive

------------------------------------

Resident Firmware: R_0-0-11

Operational Firmware: M_0-0-15

Resident FPGA: FPB004_0001_00_07

Operational FPGA : FP0004_0001_00_07
```

DRV.WARNINGS

General Information	
Type	R/O Parameter
Description	Reads the active warnings.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-50-0

Description

DRV.WARNINGS returns a list of all currently active warnings in the system.

DRV.ZERO

General Information	
Type	R/W Parameter
Description	Sets the zero mode. The procedure is activated when the drive is enabled.
Units	N/A
Range	0,1
Default Value	0
Data Type	Integer
See Also	DRV.IZERO
Start Version	M_0-0-50-0

Description

The zero procedure is a sequence in which phase commutation is initialized. During this procedure, the motor is held at a certain known electrical position (by applying a current defined by DRV.IZERO). After the motor rests at this position, the commutation angle is calculated and set automatically.

FB1 Parameters

FB1.ENCRES

General Information	
Type	NV Parameter
Description	Sets the resolution of the motor encoder.
Units	Encoder counts
Range	0 to 2^{32}-1
Default Value	1,024
Data Type	Integer
See Also	N/A
Start Version	M_0-0-14

Description

This parameter sets or gets the resolution of the motor encoder (encoder feedback systems only) in number of counts per revolution for a rotary motor and the number of encoder pitches per motor pole pitch for a linear motor. The number of encoder counts per revolution is obtained by multiplying the motor catalog resolution in units of PPR by four. For example, for a 1024 PPR resolution motor, the number of encoder counts per revolution is 1024*4 = 4096. For this motor FB1.ENCRES must be set to 4096.

For linear motors, the value of FB1.ENCRES is set to the number of encoder pitches per motor pole pitch. For a motor with 32 mm pole pitch, and a 40 µm encoder pitch, the value for FB1.ENCRES should be set to 32 mm/40 µm = 800.

FB1.HALLSTATE

General Information	
Type	R/O Parameter
Description	Reads the resolution of the motor encoder.
Units	Binary
Range	0 0 0 to 1 1 1
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-14

Description

FB1.HALLSTATE reads the Hall switch values (encoder feedback only).

FB1.IDENTIFIED

General Information	
Type	R/O Parameter
Description	Reads the type of feedback device used by the drive/motor.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	Integer
See Also	FB1.SELECT
Start Version	M_0-0-15

Description

This parameter is set according to FB1.SELECT on drive power up if FB1.SELECT is not –1; otherwise the parameter value is read from the drive memory.

Feedback Type	Description
0	Unknown
10	Incremental encoder with A/B Quad, Marker pulse & Halls
20	Sine encoder , with marker pulse & Halls
30	EnDat 2.1 with Sine Cosine
31	EnDat 2.2
32	BiSS with Sine Cosine
33	HIPERFACE
40	Resolver
41	SFD

FB1.INITSIGNED

General Information	
Type	NV Parameter
Description	Sets initial feedback value as signed or unsigned.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Integer
See Also	FB1.ORIGIN
Start Version	M-0-0-51

Description

This parameter sets whether the initial value of the feedback read from the feedback device will be set as a signed or as an unsigned value

The drive internal process for the feedback initialization is as follows:

1. Reads the position feedback.
2. Adds the origin to the feedback.
3. Determines modulo from Step 2 by the actual feedback bits.
4. Sets the position feedback sign according to FB1.INITSIGNED.

Value	Functionality
0	Set as unsigned
1	Set as signed

Example

FB1.INITSIGNED 1

FB1.MECHPOS

General Information	
Type	R/O Parameter
Description	Reads the mechanical position.
Units	counts
Range	0 to 4,294,967,295 counts
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

FB1.MECHPOS reads the mechanical angle which is equal to the lower 32 bits in the 64-bit position feedback word.

FB1.MEMVER

General Information	
Type	R/O Parameter
Description	Returns the memory feedback version.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

FB1.MEMVER returns the memory feedback version (only applicable for feedbacks with memory).

FB1.OFFSET

General Information	
Type	NV Parameter
Description	Sets position feedback offset.
Units	Depends on UNIT.ACCROTARY or UNIT.PLINEAR Rotary: counts, rad, deg, PIN/POUT, counts 16 bit Linear: counts, mm, µm, PIN/POUT, counts 16 bit
Range	Rotary: -5,123,372,000,000,005.000 to 5,123,372,000,000,005.000 counts -7495.067 to 7495.067 rad -429,436.096 to 429,436.096 deg -5,964.390 to 5,964.390 [PIN/POUT] -78,176,452.637 to 78,176,452.636 counts 16 bit Linear: -5,123,372,000,000,005.000 to 5,123,372,000,000,005.000 counts -1192.878*MOTOR.PITCH to 1192.878*MOTOR.PITCH mm -1192877.952*MOTOR.PITCH to 1192877.952*MOTOR.PITCH µm -5964.390 to 5964.390 PIN/POUT -78176452.637 to 78176452.636 counts 16 bit
Default Value	0
Data Type	Float
See Also	PL.FB
Start Version	M_0-0-15

Description

FB1.OFFSET is a value added to the position feedback (PL.FB).

Example

If PL.FB is 10 deg and FB1.OFFSET is set to –10 deg, then the next read of PL.FB will return ~0 deg.

FB1.ORIGIN

General Information	
Type	NV Parameter
Description	Adds to the initial feedback position.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: counts, rad, deg, PIN/POUT, counts 16 Bit Linear: counts, mm, µm, PIN/POUT, counts 16 Bit
Range	Rotary: 0.000 to 5,123,372,000,000.000 counts 0.000 to 7,495.067 rad 0.000 to 429,436.096 deg 0.000 to 5,964.390 PIN/POUT 0.000 to 78,176,452.636 counts16 Bit Linear: 0.000 to 5,123,372,000,000.000 Counts 0.000 to 1,192.878 mm 0.000 to 1,192,877.952 µm 0.000 to 5,964.390 PIN/POUT 0.000 to 78,176,452.636 counts16 Bit
Default Value	0 counts
Data Type	Float
See Also	FB1.INITSIGNED
Start Version	M-0-0-51

Description

FB1.ORIGIN is a value that is added to the feedback device position. Initial value and modulo are determined from the number of bits of the feedback:

Initial position value = (<feedback from device> + FB1.ORIGIN) modulo <number of feedback bits>

The number of feedback bits is set according to the feedback type. For memory feedbacks it is the number of feedback bits; for none memory it is always single turn.

The drive internal process for the feedback initialization is as follows:

1. Reads the position feedback.
2. Adds the origin to the feedback.
3. Determines modulo from Step 2 by the actual feedback bits.
4. Sets the position feedback sign according to FB1.INITSIGNED.

Example

This example uses UNIT.PROTARY set to 2 (degrees)

It also assumes that the AKD is connected to a single turn feedback device with memory.

FB1.ORIGIN is set to 22 and saved into NV memory.

Drive boots and reads from feedback device position 340 degrees. According to the description section above, calculation will be:

(340 + 22) modulo 360 = 2 degrees.

Therefore the initial feedback value will be set to 2 degrees.

FB1.PFIND

General Information	
Type	R/W Parameter
Description	A procedure that allows the user to find the commutation angle for encoder feedback, which has no halls.
Units	NA
Range	0, 1
Default Value	0
Data Type	Integer
See Also	FB1.PFINDCMDU
Start Version	M_0-0-53

Description

A procedure that allows the user to find the commutation angle for encoder feedback (which has no Halls).

FB1.PFINDCMDU

General Information	
Type	R/W Parameter
Description	Current value used during the phase finding procedure (PFB.PFIND=1)
Units	A
Range	0 to DRV.IPEAK
Default Value	0
Data Type	Float
See Also	PFB.PFIND
Start Version	M_0-0-53

Description

FB1.PFINDCMDU sets the current value used during the phase finding procedure.

FB1.POLES

General Information	
Type	R/O Parameter
Description	Reads the number of feedback poles.
Units	N/A
Range	2 to 128
Default Value	2
Data Type	Integer
See Also	MOTOR.POLES
Start Version	M_0-0-15

Description

FB1.POLES sets the number of individual poles in the feedback device. This variable is used for the commutation function, as well as for velocity feedback scaling, and represents the number of individual poles (not pole pairs). The division value of motor poles (MOTOR.POLES) and feedback poles (FB1.POLES) must be an integer when moving drive to enable, otherwise a fault is issued.

FB1.PSCALE

General Information	
Type	R/W Parameter
Description	Sets position scaling value.
Units	N/A
Range	0 to 32
Default Value	20
Data Type	Integer
See Also	N/A
Start Version	M_00-00-51-000

Description

This parameter converts a 64-bit position value into a 32-bit position value. This parameter mostly affects position values (which are transferred via a fieldbus system), since not all fieldbus systems are capable of transferring 64-bit variables.

FB1.PSCALE determines the number of bits for a 32-bit position, which represent the mechanical angle. Thus, for FB1.PSCALE 32 bits are used to display the number of turns.

Example

The drive always works internally with 64-bit position values. The drive internal 64-bit actual position should contain the following value:

0x0000.0023.1234.ABCD

The lower 32 bits represent the mechanical angle of the feedback. The upper 32 bits represent the number of turns.

FB1.PSCALE = 20

The 32-bit position is: 0x0231234A

FB1.PSCALE = 16

The 32-bit position is: 0x00231234

FB1.RESKTR

General Information	
Type	NV Parameter
Description	Sets the resolver nominal transformation ratio.
Units	N/A
Range	0.001 to 50.000
Default Value	0.5
Data Type	Float
See Also	N/A
Start Version	M-0-0-50

Description

This parameter sets the resolver nominal transformation ratio. It affects the resolver excitation output amplitude. The value can be obtained from the resolver data sheet.

Example

FB1.RESKTR 0.5

FB1.RESREFPHASE

General Information	
Type	NV Parameter
Description	Sets the electrical degrees of phase lag in the resolver.
Units	electrical degrees
Range	-180 to 180°
Default Value	-2°
Data Type	Float
See Also	N/A
Start Version	M-0-0-50-0

Description

This parameter sets the electrical degrees of phase lag in the resolver.

See the motor resolver datasheet for the value for this parameter .

Example

FB1.RESREFPHASE -2

FB1.SELECT

General Information	
Type	NV Parameter
Description	Sets user entered type or identified type (–1).
Units	N/A
Range	–1, 10, 20, 30, 31, 32, 40, 41
Default Value	–1
Data Type	Integer
See Also	FB1.IDENTIFIED
Start Version	M_0-0-15

Description

FB1.SELECT sets the feedback type manually (see FB1.IDENTIFIED) or allows the drive to automatically identify the feedback type on power up.

FB1.SELECT Input Values

Input Value	Description
–1	The drive automatically identifies the type of feedback as part of the power up process. Setting this value does not modify FB1.IDENTIFIED, unless it is saved in the NV memory for the next power up. If a feedback with memory is connected to the drive, the value of FB1.IDENTIFIED is set automatically to the feedback identified and all parameters read from the feedback are set according to the values read from the feedback. If no feedback is connected or a feedback with no memory is connected, the value of FB1.IDENTIFIED is set to 0 (no feedback identified) and all values normally read from the feedback are read from NV memory (if stored in NV) otherwise they are set to the default values.
10	Manually sets the type to incremental encoder. This input sets the value of FB1.IDENTIFIED to 10. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).
20	Manually sets the type to sine encoder. This input sets the value of FB1.IDENTIFIED to 20. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).
30	Manually sets the type to Endat 2.1. This input sets the value of FB1.IDENTIFIED to 30. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).
31	Manually sets the type to Endat 2.2. This input sets the value of FB1.IDENTIFIED to 31. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).
32	Manually sets the type to BiSS. This input sets the value of FB1.IDENTIFIED to 32. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).
33	Manually sets the type to Hyperface. This input sets the value of FB1.IDENTIFIED to 33. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).

Input Value	Description
40	Manually sets the type to resolver. This input sets the value of FB1.IDENTIFIED to 40. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).
41	Manually sets the type to SFD. This input sets the value of FB1.IDENTIFIED to 41. If the feedback setting fails, FB1.IDENTIFIED is automatically set to 0 (no feedback identified).

FB1.SELECT Feedback Types

Type	Description
0	Unknown
10	Incremental encoder with A/B Quad, marker pulse & Hall
20	Sine Encoder , with marker pulse & Hall
30	EnDat 2.1 with Sine Cosine
31	EnDat 2.2
32	BiSS with Sine Cosine
33	HIPERFACE
40	Resolver
41	SFD

FB1.TRACKINGCALC

General Information	
Type	NV Parameter
Description	Controls tracking calibration algorithm.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M-0-0-50

Description

This parameter turns the tracking calibration algorithm on or off for sine-cosine or resolver.

Value	Functionality
0	Tracking calibration is off
1	Tracking calibration is on

Example

FB1.TRACKINGCALC 1

FBUS Parameters

FBUS.PARAM1 TO FBUS.PARAM20

General Information	
Type	NV Parameter
Description	Set fieldbus specific meanings.
Units	N/A
Range	0 to 2^{31}
Default Value	0
Data Type	Integer, U32
See Also	CANopen Communication Manual, EtherCAT Communication Manual
Start Version	M_0-0-33

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	FBUS.PARAM1 to FBUS.PARAM10: 0x36E5 sub 0 to 0x36EE sub 0
Data Type	Unsigned 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

These parameters set the fieldbus baud rate.

FBUS.PARAM01 sets the baud rate: Supported baud rates are 125, 250, 500 and 1000 kBaud.

FBUS.PARAM02 switches the phase locked loop (PLL) for synchronized use: 0 = OFF, 1 = ON

FBUS.PARAM04 switches the surveillance of SYNC-signals: 0 = OFF, 1 = ON

FBUS.PARAM03, FBUS.PARAM05 - FBUS.PARAM10 are reserved.

FBUS.PARAM04 Additional Notes

Fieldbus Parameter 4 enables (1) or disables(0) the synchronization supervision of the CANOpen or EtherCAT fieldbus.

Default values:

- CANOpen: disabled (0)
- EtherCAT: enabled (1)

The surveillance is active, when

- Parameter 4 = 1
- The first CANOpen Sync message or first EtherCAT frame was received.

When more than three CANOpen sync messages or seven EtherCAT frames were not received, AND the drive is enabled, the fault "Sync lost" (FAULT_CMDH_FIELDBUS_SYNC_LOST = 125) occurs.

FBUS.PLLTHRESH

General Information	
Type	NV Parameter
Description	Sets number of successful synchronized cycles needed to lock the PLL.
Units	N/A
Range	0 to 10,000
Default Value	0
Data Type	Integer, U32
See Also	Appendix B: Fieldbus Manuals
Start Version	M_0-0-33

Description

This parameter sets number of successful synchronized cycles needed to lock the PLL.

FBUS.SAMPLEPERIOD

General Information	
Type	NV Parameter
Description	Sets fieldbus sample period.
Units	Whole multiples of MTS 62.5 µs
Range	1 to 128 and value must be a power of 2
Default Value	32 = 2 ms
Data Type	U8
See Also	Appendix B: Fieldbus Manuals
Start Version	M_0-0-33

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	60C2h/0
Data Type	Unsigned 8
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter sets the fieldbus cycle time. It is normally written in the startup phase of the field busses via the object 60C2 subindex 1 (interpolation time units) and 2 (interpolation time index), where the index stands for a power of 10 seconds (for instance, -3 stands for milliseconds) and the units are the counts of these units.

FBUS.SYNCACT

General Information	
Type	R/O Parameter
Description	Reads actual distance from the desired sync distance.
Units	ns
Range	
Default Value	
Data Type	Integer, U32
See Also	Appendix B: Fieldbus Manuals
Start Version	M_0-0-33

Description

This parameter reads actual distance from the desired sync distance.

FBUS.SYNCDIST

General Information	
Type	NV Parameter
Description	Sets time target for synchronization.
Units	ns
Range	0 to 250,000
Default Value	100,000
Data Type	Integer, U32
See Also	Appendix B: Fieldbus Manuals
Start Version	M_0-0-33

Description

This parameter sets time target for synchronization.

FBUS.SYNCWND

General Information	
Type	NV Parameter
Description	Sets symmetrically arranged window around the desired sync distance.
Units	ns
Range	0 to 1,000,000
Default Value	50,000
Data Type	Integer, U2
See Also	Appendix B: Fieldbus Manuals
Start Version	M_0-0-33

Description

This parameter sets symmetrically arranged window around the desired sync distance.

FBUS.TYPE

General Information	
Type	R/O Parameter
Description	Shows the active fieldbus type.
Units	N/A
Range	0 to 3
Default Value	0
Data Type	U8
See Also	Appendix B: Fieldbus Manuals
Start Version	M_0-0-33

Description

0 = No fieldbus available

1 = SynqNet

2 = CANopen

3 = EtherCAT

GEAR Parameters

GEAR.ACCMAX

General Information	
Type	R/W Parameter
Description	Sets the maximum allowed acceleration value.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s^2, (PIN/POUT)/s^2, rad/s^2 Linear: counts/s^2, mm/s^2, µm/s^2, (PIN/POUT)/s^2
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s^2 0.155 to 4,166,666.752 (PIN/POUT)/s^2 0.195 to 5,235,987.968 rad/s^2 Linear: 0.000 to 833.333 counts/s^2 0.031*MOTOR.PITCH to 833,333.333*MOTOR.PITCH mm/s^2 30.994*MOTOR.PITCH to 83,3333,333.333*MOTOR.PITCH µm/s^2 0.155 to 4,166,666.667 (PIN/POUT)/s^2
Default Value	Rotary: 50.000 rps/s 3,000.000 rpm/s 18,000.000 deg/s^2 250.000 (PIN/POUT)/s^2 314.159 rad/s^2 Linear: 0.050 Counts/s^2 1.000*MOTOR.PITCH mm/s^2 1000.000*MOTOR.PITCH µm/s^2 250.000 (PIN/POUT)/s^2
Data Type	Float
See Also	UNIT.ACCROTARY, UNIT.ACCLINEAR, GEAR.DECMAX
Start Version	M_0-0-50-0

Description

This parameter limits the acceleration of the slave to a numerical higher value.

GEAR.DECMAX

General Information	
Type	R/W Parameter
Description	Sets the maximum allowed deceleration value
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s^2, (PIN/POUT)/s^2, rad/s^2 Linear: counts/s^2, mm/s^2, µm/s^2, (PIN/POUT)/s^2
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s^2 0.155 to 4,166,666.752 (PIN/POUT)/s^2 0.195 to 5,235,987.968 rad/s^2 Linear: 0.000 to 833.333 c/s^2 0.031*MOTOR.PITCH to 833,333.333*MOTOR.PITCH mm/s^2 30.994*MOTOR.PITCH to 833,333,333.333*MOTOR.PITCH µm/s^2 0.155 to 4,166,666.667 (PIN/POUT)/s^2
Default Value	Rotary: 50.000 rps/s 3,000.000 rpm/s 18,000.000 deg/s^2 250.000 (PIN/POUT)/s^2 314.159 rad/s^2 Linear: 0.050 counts/s^2 1.000*MOTOR.PITCH mm/s^2 1,000.000*MOTOR.PITCH µm/s^2 250.000 (PIN/POUT)/s^2
Data Type	Float
See Also	UNIT.ACCROTARY, UNIT.ACCLINEAR, GEAR.ACCMAX
Start Version	M_0-0-50-0

Description

This parameter limits the deceleration of the slave to a numerical higher value.

GEAR.IN

General Information	
Type	R/W Parameter
Description	Sets the denominator of the electronic gearing ratio.
Units	N/A
Range	1 to 65,535
Default Value	1
Data Type	Integer
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter sets the denominator of the gear ratio for the electronic gearing mode. The gear ratio is used in order to increase and decrease the slave velocity. The slave velocity can be calculated by the following formula:

Slave velocity = Master velocity * GEAR.OUT/GEAR.IN

Be sure that you set the external master source number of signals per revolution correctly. Also, select the gear ratio so that the maximum electronic gearing velocity (GEAR.VELMAX) is not exceeded.

Master velocitymax * GEAR.OUT/GEAR.IN < GEAR.VELMAX

GEAR.MODE

General Information	
Type	R/W Parameter
Description	Selects electronic gearing mode.
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter selects the electronic gearing mode at the beginning of the electronic gearing procedure.

GEAR.MOVE

General Information	
Type	Command
Description	Starts the electronic gearing.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-50-0

Description

The command GEAR.MOVE starts the electronic gearing procedure according to the selected electronic gearing mode. The electronic gearing process can be stopped using the DRV.STOP command.

GEAR.OUT

General Information	
Type	R/W Parameter
Description	Sets the numerator of the electronic gearing ratio
Units	N/A
Range	-32,768 to +32,767
Default Value	1
Data Type	Integer
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter is the numerator of the gear ratio for the electronic gearing mode. The gear ratio is used in order to increase/decrease the slave velocity. The slave velocity can be calculated by the following formula:

Slave velocity = Master velocity * GEAR.OUT/GEAR.IN

Make sure that the external master source has been set properly. Also, be certain to select a gear ratio such that the maximum electronic gearing velocity (GEAR.VELMAX) will not be exceeded.

Master velocitymax * GEAR.OUT/GEAR.IN < GEAR.VELMAX

GEAR.VMAX

General Information	
Type	R/W Parameter
Description	Maximum allowed velocity value
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: 0.001 to 12,000.000 rpm 0.001 to 200.000 rps 0.001 to 72,000.000 deg/s 0.001 to 1,000.000 (PIN/POUT)/s 0.001 to 1256.637 rad/s Linear: 0.001 to 0.200 counts/s 0.001*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s 0.004*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/sec 0.001 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: 12,000.000 rpm 200.000 rps 17,999.998 deg/s 250.000 (PIN/POUT)/s 1,256.637 rad/s Linear: 0.050 Counts/s 50.000*MOTOR.PITCH mm/s 49,999.996*MOTOR.PITCH µm/sec 250.000 (PIN/POUT)/s
Data Type	Float
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter limits the maximum velocity of the slave drive.

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HOME Parameters

HOME.ACC

General Information	
Type	R/W Parameter
Description	Sets homing acceleration.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s^2, (PIN/POUT)/s^2, rad/s^2 Linear: counts/s^2, mm/s^2, µm/s^2, (PIN/POUT)/s^2
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s^2 0.155 to 4,166,666.752 (PIN/POUT)/s^2 0.195 to 5,235,987.968 rad/s^2 Linear: 0.000 to 833.333 counts/s^2 0.031*MOTOR.PITCH to 833,333.333*MOTOR.PITCH mm/s^2 30.994*MOTOR.PITCH to 833,333,333.333*MOTOR.PITCH µm/s^2 0.155 to 4,166,666.667 (PIN/POUT)/s^2
Default Value	Rotary: 50.000 rps/s 3,000.000 rpm/s 18,000.000 deg/s^2 250.000 (PIN/POUT)/s^2 314.159 rad/s^2 Linear: 0.050 counts/s^2 1.000*MOTOR.PITCH mm/s^2 1,000.000*MOTOR.PITCH µm/s^2 250.000 (PIN/POUT)/s^2
Data Type	Float
See Also	UNIT.ACCROTARY, UNIT.ACCLINEAR
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3502h/0
Data Type	Integer 32
PDO Mappable	N/A
Start Version	

Description

This parameter determines the acceleration of the motor during the homing procedure.

HOME.DEC

General Information	
Type	R/W Parameter
Description	Sets homing deceleration.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEARUNIT.A-CCLINEAR Rotary: rps/s, rpm/s, deg/s^2, (PIN/POUT)/s^2, rad/s^2 Linear: counts/s^2, mm/s^2, µm/s^2, (PIN/POUT)/s^2
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s^2 0.155 to 4,166,666.752 (PIN/POUT)/s^2 0.195 to 5,235,987.968 rad/s^2 Linear: 0.000 to 833.333 counts/s^2 0.031*MOTOR.PITCH to 833,333.333*MOTOR.PITCH mm/s^2 30.994*MOTOR.PITCH to 833,333,333.333*MOTOR.PITCH µm/s^2 0.155 to 4,166,666.667 (PIN/POUT)/s^2
Default Value	Rotary: 50.000 rps/s 3,000.000 rpm/s 18,000.000 deg/s^2 250.000 (PIN/POUT)/s^2 314.159 rad/s^2 Linear: 0.050 counts/s^2 1.000*MOTOR.PITCH mm/s^2 1000.000*MOTOR.PITCH µm/s^2 250.000 (PIN/POUT)/s^2
Data Type	Float
See Also	UNIT.ACCROTARY, UNIT.ACCLINEAR
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3524h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter sets the deceleration of the motor during the homing procedure.

HOME.DIR

General Information	
Type	NV Parameter
Description	Sets homing direction.
Units	N/A
Range	0 to 1
Default Value	1
Data Type	Integer
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter determines the direction in which the motor should start to move during a homing procedure.

0 = Movement in negative direction.

1 = Movement in positive direction.

HOME.DIST

General Information	
Type	R/W Parameter
Description	Sets homing distance.
Units	Depends on UNIT.PROTARY or UNIT.PLINEARUNIT.ACCLINEAR Rotary: counts, rad, deg, PIN/POUT, counts 16 bit Linear: counts, mm, µm, PIN/POUT, counts 16 bit
Range	N/A
Default Value	0
Data Type	Float
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter takes effect only after the homing procedure is complete (see the HOME.MODE description). HOME.DIST specifies an additional movement after the homing procedure is complete. The drive uses the homing acceleration, deceleration, and velocity parameters for this movement. This parameter can be used to let the motor move away from the home position by the value of HOME.DIST.

A value not equal to 0 triggers an additional movement of the selected homing distance after the general homing procedure. A value of 0 for HOME.DIST causes no additional movement.

HOME.FEEDRATE

General Information	
Type	R/W Parameter
Description	Sets homing velocity factor.
Units	%
Range	0 to 100%
Default Value	50%
Data Type	Integer
See Also	N/A
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	6099h/2
Data Type	Unsigned 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter is used in order to reduce the velocity during the index search (index = zero-pulse of a feedback device). This parameter determines the percentage of the homing velocity (HOME.V) that should be used during the index-search.

HOME.IPEAK

General Information	
Type	R/W Parameter
Description	Sets the current limit during homing procedure to a mechanical stop
Units	A
Range	± Drive peak current A
Default Value	[(1/120) * DRV.IPEAK] A
Data Type	Float
See Also	HOME.MODE
Start Version	M_00-00-62

Description

This parameter sets the intermediate current limit during a homing procedure to a mechanical stop (HOME.MODE 8, 9 or 10). The current-controller limit (IL.LIMITP and IL.LIMITN) is set to ±HOME.IPEAK while the homing procedures are active.

HOME.IPEAK is active as soon as the homing procedure starts and remains active until the home position is found. Previous current limit settings are re-activated before the motor covers the homing distance (HOME.DIST ≠ 0).

HOME.MODE

General Information	
Type	R/W Parameter
Description	Selects the homing mode.
Units	N/A
Range	0 to 10
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-50-0

Description

HOME.MODE specifies the homing procedure of the drive. There are 10 homing modes available in the drive.

Homing mode 0 (set immediately the home position):

The actual- and the command position of the drive will be immediately be set to the HOME.P value.

Homing mode 1 (homing to hardware limit switches):

This homing mode starts a motion to a positive or negative hardware limit switch. The sequence of this homing mode is as follows:

1. The motor starts to move according to the HOME.DIR setting.
2. The motor stops as soon as the hardware limit switch has been detected and changes afterwards the direction of the movement.
3. The home position has been found as soon as the hardware limit switch is not active any more. The actual- and the command position of the drive will immediately be set to the HOME.P value and the motor ramps down to velocity 0.

Homing mode 2 (homing to hardware limit switch with movement to zero-angle):

This homing mode starts a motion to a positive or negative hardware limit switch. The home position is located at the mechanical zero-angle of the feedback. The sequence of this homing mode is as follows:

1. The motor starts to move according to the HOME.DIR setting.
2. The motor stops as soon as the hardware limit switch has been detected and changes afterwards the direction of the movement.
3. The home position has been found as soon as the hardware limit switch is not active any more. The actual- and the command position of the drive will immediately be set to the HOME.P value plus distance to the mechanical zero angle of the feedback device according to the current direction.
4. The motor decelerates until velocity 0 has been reached.
5. The motor moves to the home position (HOME.P), which is located at the mechanical zero-angle of the feedback.

Homing mode 3 (homing to hardware limit switch with index detection):

This mode is not implemented yet.

This homing mode starts a motion to a positive or negative hardware limit switch. The home position is located at the point where the index signal (the zero-pulse signal of a feedback device) has been detected by the drive. The sequence of this homing mode is as follows:

1. The motor starts to move according to the HOME.DIR setting.
2. The motor stops as soon as the hardware limit switch has been detected and changes afterwards the direction of the movement.
3. The motor ramps down to a reduced velocity as soon as the hardware limit switch is not active any more (please refer also to HOME.FEEDRATE). The Drive is searching for the index-signal during this time. The home-position has been found as soon as the index-signal has been detected by the Drive.
4. The actual- and the command position of the Drive will be set to the HOME.P value as soon as the index-signal was found and the Drive ramps down to velocity 0.

Homing mode 4 (homing to a home-switch):

This homing mode starts a motion until a digital input, which is assigned to act as a home-switch, has been activated.

The home-switch must be activated according to the setting of the HOME.DIR setting. The home position is found as soon as the home-switch was activated during a motion in direction of the HOME.DIR setting.

The sequence of this homing mode is as follows:

1) The motor starts to move according to the HOME.DIR setting.

2) The home position has been found as soon as the home-switch becomes active during a motion in direction of the HOME.DIR setting. The actual- and the command position of the Drive will immediately be set to the HOME.P value and the motor ramps down to velocity 0.

Remarks:

The hardware limit switches are monitored during the whole homing procedure. The Drive behaves as follows in case that a hardware limit switch is active before the home-switch has been activated:

a) The motor changes the direction until the home switch is crossed.

b) The motor ramps down to velocity 0 and changes afterwards the direction again after crossing the home-switch.

c) The home-switch will now be activated according to the HOME.DIR setting and the home-position has been found. The actual- and the command position of the Drive will immediately be set to the HOME.P value and the motor ramps down to velocity 0.

Homing mode 5 (homing to a home-switch with movement to zero-angle):

This homing mode starts a motion until a digital input, which is assigned to act as a home-switch, has been activated. The motor moves afterwards to the mechanical zero-angle of the feedback.

The home-switch must be activated according to the setting of the HOME.DIR setting. The home position is found as soon as the home-switch was activated during a motion in direction of the HOME.DIR setting.

The sequence of this homing mode is as follows:

1. The motor starts to move according to the HOME.DIR setting.
2. The home position has been found as soon as the home-switch becomes active during a motion in direction of the HOME.DIR setting. The actual- and the command position of the drive will immediately be set to the HOME.P value plus distance to the mechanical zero angle of the feedback device according to the current direction.
3. The motor decelerates until velocity 0 has been reached.
4. The motor moves to the home position (HOME.P), which is located at the mechanical zero-angle of the feedback.

Remarks:

The hardware limit switches are monitored during the whole homing procedure. The drive behaves as follows in case that a hardware limit switch is active before the home-switch has been activated:

1. The motor changes the direction until the home switch is crossed.
2. The motor ramps down to velocity 0 and changes afterwards the direction again after crossing the home-switch.
3. The home-switch will now be activated according to the HOME.DIR setting and the home-position has been found. The actual- and the command position of the drive will immediately be set to the HOME.P value plus distance to the mechanical zero angle of the feedback device according to the current direction.
4. The motor decelerates until velocity 0 has been reached.
5. The motor moves to the home position (HOME.P), which is located at the mechanical zero-angle of the feedback.

Homing mode 6 (homing to a home-switch with index detection):

This mode is not implemented yet.

This homing mode starts a motion until a digital input, which is assigned to act as a home-switch, has been activated. The motor moves afterwards with a reduced velocity HOME.FEEDRATE until the index signal (the zero-pulse signal of a feedback device) has been detected by the drive.

The home-switch must be activated according to the setting of the HOME.DIR setting.

The sequence of this homing mode is as follows:

1. The motor starts to move according to the HOME.DIR command.
2. The motor decelerates to a reduced velocity according to the HOME.FEEDRATE setting as soon as the home-switch becomes active during a motion in direction of the HOME.DIR setting.
3. The actual- and the command position of the drive will immediately be set to the HOME.P value as soon as the index-signal has been detected. The motor decelerates until velocity 0 has been reached.

Remarks:

The hardware limit switches are monitored during the whole homing procedure. The Drive behaves as follows in case that a hardware limit switch is active before the home-switch has been activated:

a) The motor changes the direction until the home-switch is crossed.

b) The motor ramps down to velocity 0 and changes afterwards the direction again after crossing the home-switch.

c) The home-switch will now be activated according to the HOME.DIR command. The motor decelerates to a reduced velocity according to the HOME.FEEDRATE setting as soon as the home-switch becomes active.

d) The actual- and the command position of the drive will immediately be set to the HOME.P value as soon as the index-signal has been detected. The motor decelerates until velocity 0 has been reached.

Homing mode 7 (homing to the mechanical zero-angle of the feedback):

This homing mode starts a motion to the mechanical zero-angle of the feedback in direction of the HOME.DIR setting.

The sequence of this homing mode is as follows:

1. The home-position is immediately found by the drive. The actual and the command position of the drive are set to the HOME.P value plus distance to the mechanical zero angle of the feedback device according to the HOME.DIR setting.
2. The motor moves to the home position (HOME.P), which is located at the mechanical zero-angle of the feedback

Homing mode 8 (homing to a mechanical stop):

This homing mode starts a motion to a mechanical stop. A mechanical stop is detected as soon as the absolute value of the position error (PL.ERR) is larger than the HOME.PERRTHRESH setting. During this homing method the current command value is limited to the TBD value.

The sequence of this homing mode is as follows:

1) The motor starts to move according to the HOME.DIR command.

2) The actual- and the command position of the Drive will immediately be set to the HOME.P value as soon as the absolute value of PL.ERR is larger than the HOME.PERRTHRESH setting. The homing is immediately finished.

Remark:

It must be ensured that the current limitation (TBD) has been set to a reasonable value in order to prevent the machine from too much mechanical force when moving against a mechanical stop.

Homing mode 9 (homing to a mechanical stop plus movement to the mechanical zero-angle of the feedback):

This homing mode starts a motion to a mechanical stop. A mechanical stop is detected as soon as the absolute value of the position error (PL.ERR) is larger than the HOME.PERRTHRESH setting. During this homing method the current command value is limited to the TBD value. The motor moves afterwards in the opposite direction to the zero-angle of the feedback.

The sequence of this homing mode is as follows:

1) The motor starts to move according to the HOME.DIR command.

2) The actual- and the command position of the Drive will immediately be set to the HOME.P value plus distance to the mechanical zero angle of the feedback device according to opposite direction of DRV.DIR as soon as the absolute value of PL.ERR is larger than the HOME.PERRTHRESH setting.

3) The motor starts now moving to the opposite direction of the DRV.DIR setting until the home position (HOME.P) has been reached, which is located at the mechanical zero-angle of the feedback.

Remark:

It must be ensured that the current limitation (TBD) has been set to a reasonable value in order to prevent the machine from too much mechanical force when moving against a mechanical stop.

Homing mode 10 (homing to a mechanical stop plus with index detection):

This mode is not implemented yet.

This homing mode starts a motion to a mechanical stop. A mechanical stop is detected as soon as the absolute value of the position error (PL.ERR) is larger than the HOME.PERRTHRESH setting. During this homing method the current command value is limited to the TBD value. The motor moves afterwards with a reduced velocity (HOME.FEEDRATE) until the index signal (the zero-pulse signal of a feedback device) has been detected by the Drive.

The sequence of this homing mode is as follows:

1) The motor starts to move according to the HOME.DIR command.

2) The motor changes the direction with a reduced velocity (HOME.FEEDRATE) as soon as the absolute value of PL.ERR is larger than the HOME.PERRTHRESH setting.

3) The actual- and the command position of the Drive will immediately be set to the HOME.P value as soon as the index-signal has been detected. The motor decelerates until velocity 0 has been reached.

Remark:

It must be ensured that the current limitation (TBD) has been set to a reasonable value in order to prevent the machine from too much mechanical force when moving against a mechanical stop.

HOME.MOVE

General Information	
Type	Command
Description	Starts a homing procedure.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-38

Description

The HOME.MOVE command starts a homing procedure. The DRV.OPMODE must be set to 2 (closed position loop) and DRV.CMDSOURCE must be set to 0 (TCP/IP command).

HOME.P

General Information	
Type	R/W Parameter
Description	Sets home position.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR Rotary: counts, rad, deg, PIN/POUT, counts 16 bit Linear: counts, mm, µm, PIN/POUT, counts 16 bit
Range	N/A
Default Value	0
Data Type	Float
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter sets the home position. The command and actual position of the drive will be set to this value as soon as a homing event occurs. The homing events differ in each homing mode.

HOME.PERRTHRESH

General Information	
Type	R/W Parameter
Description	Position lag threshold.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR Rotary: counts, rad, deg, PIN/POUT, Countes16 bit Linear: counts, mm, µm, PIN/POUT, Counts16 bit
Range	N/A
Default Value	N/A
Data Type	Float
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter is used for the homing modes against a mechanical stop (HOME.MODE = 8, 9, and 10). The absolute value of the following error (PL.ERR) is compared with HOME.PERRTHRESH in order to detect a mechanical stop.

HOME.SET

General Information	
Type	Command
Description	Immediately sets the home position.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	N/A
Start Version	M_0-0-38

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	35F0h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

The HOME.SET command immediately homes the drive. The drive can be homed in an enabled or disabled state. Motion in the current mode of operation (DRV.OPMODE=0) or velocity mode of operation (DRV.O-PMODE=1) is not affected by the HOME.SET command. Motion in the position mode of operation (DRV.O-PMODE=2) is immediately aborted when the HOME.SET command is issued.

HOME.V

General Information	
Type	R/W Parameter
Description	Sets homing velocity.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: 0.001 to 12,000.000 rpm 0.001 to 200.000 rps 0.001 to 72,000.000 deg/s 0.001 to 1,000.000 (PIN/POUT)/s 0.001 to 1,256.637 rad/s Linear: 0.001 to 0.200 counts/s 0.001*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s 0.004*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/sec 0.001 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: 12,000.000 rpm 200.000 rps 17,999.998 deg/s 250.000 (PIN/POUT)/s 1,256.637 rad/s Linear: 0.050 counts/s 1.000*MOTOR.PITCH mm/s 999.998*MOTOR.PITCH µm/sec 250.000 (PIN/POUT)/s
Data Type	Float
See Also	N/A
Start Version	M_0-0-50-0

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	6099h/1
Data Type	Unsigned 32
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

This parameter sets the velocity of the motor during the homing procedure.

HWLS Parameters

HWLS.NEGSTATE

General Information	
Type	R/O Parameter
Description	Reads the status of the negative hardware limit switch.
Units	0 to 1
Range	N/A
Default Value	Boolean
Data Type	HWLS.POSSTATE
See Also	N/A
Start Version	M_00-00-62-000

Description

HWLS.NEGSTATE reads the status of the negative HW limit switch as follows:

0 = low

1 = high

HWLS.POSSTATE

General Information	
Type	R/O Parameter
Description	Reads the status of the positive hardware limit switch.
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Boolean
See Also	HWLS.NEGSTATE
Start Version	M_00-00-62-000

Description

HWLS.POSSTATE reads the status of the positive hardware limit switch as follows:

0 = low

1 = high

IL Parameters

IL.BUSFF

General Information	
Type	R/O Parameter
Description	Displays the current feedforward value injected by the fieldbus
Units	A
Range	N/A
Default Value	N/A
Data Type	Float
See Also	IL.KBUSFF
Start Version	M_0-0-32

Description

This parameter displays the current feedforward value injected by the fieldbus

IL.CMD

General Information	
Type	R/O Parameter
Description	Reads the value of the q-component current controller inside the FPGA.
Units	Arms
Range	± Drive peak current
Default Value	N/A
Data Type	Float
See Also	DRV.IPEAK
Start Version	M_0-0-15

Description

IL.CMD displays the q-component current command value of the current loop after any limitation (such as a parameter setting or I^2t calculation).

IL.CMDU

General Information	
Type	R/W Parameter
Description	Sets the user current command.
Units	A
Range	± Drive peak current
Default Value	0 A
Data Type	Float
See Also	DRV.IPEAK, DRV.OPMODE,DRV.CMDSOURCE
Start Version	M_0-0-15

Description

This parameter sets the user current command value.

The current command value, which is provided to the current loop (IL.CMD), can be limited further using a parameter setting or I^2t calculation.

IL.DIFOLD

General Information	
Type	R/O Parameter
Description	Reads the drive foldback current limit.
Units	A
Range	0 to 2,147,483.647 A
Default Value	N/A
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3559h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

IL.DIFOLD is the output of the drive foldback algorithm. It is an artificial current, which can be higher or lower than the drive peak current. When IL.DIFOLD is lower than the existing current limit (such as IL.LIMITP), it becomes the active current limit.

IL.DIFOLD decreases when the actual current is higher than drive continuous current and increases (up to a certain level) when the actual current is lower than drive continuous current.

IL.FB

General Information	
Type	R/O Parameter
Description	Reads the actual value of the d-component current.
Units	Arms
Range	± Drive peak current
Default Value	N/A
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Description

This parameter reads the measured, de-rotated actual current value of the motor.

IL.FF

General Information	
Type	R/O Parameter
Description	Displays the current loop overall feedforward value
Units	A
Range	NA
Default Value	NA
Data Type	Float
See Also	IL.KBUSFF, IL.KVFF, IL.OFFSET, IL.FRICTION, IL.KACCFF
Start Version	M_0-0-32

Description

This parameter displays the current loop overall feedforward value.

IL.FOLDFTHRESH

General Information	
Type	R/O Parameter
Description	Sets the foldback fault level.
Units	Arms
Range	0 to 500 Arms
Default Value	Drive peak current
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE and CANopen
Index/Subindex or Parameter Number	3420h/0
Data Type	Unsigned 16
PDO Mappable	No
Start Version	M_00-00-62-000

Description

IL.FOLDFTHRESH is the fault level of the current foldback algorithm. If IL.IFOLD drops below the value for IL.FOLDFTHRESH, then a fault is generated and the drive is disabled.

To avoid reaching the current foldback fault level, set IL.FOLDFTHRESH well below the continuous current value for both the drive and the motor or set the IL.FOLDFTHRESH value to zero.

IL.FOLDFTHRESHU

General Information	
Type	NV Parameter
Description	Sets the user value for the foldback fault level.
Units	Arms
Range	0 to 500 Arms
Default Value	Drive peak current
Data Type	Float
See Also	IL.FOLDFTHRESH, Foldback
Start Version	M_00-00-55-000

Description

IL.FOLDFTHRESHU is the fault level of the current foldback algorithm. The value of IL.FOLDFTHRESH is the minimum of DRV.IPEAK, MOTOR.IPEAK, and IL.FOLDFTHRESH.

IL.FOLDWTHRESH

General Information	
Type	NV Parameter
Description	Sets the foldback warning level.
Units	Arms
Range	0 to 500 Arms
Default Value	0 A
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	355Ah/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

IL.FOLDWTHRESH is the warning level of the current foldback algorithm. When IL.IFOLD drops **below** IL.FOLDWTHRESH a warning is generated.

To ensure that the current foldback warning level is never reached, IL.FOLDWTHRESH should be set well below the continuous current value for both the drive and the motor. You can also set the IL.FOLDFTHRESH value to zero.

IL.FRICTION

General Information	
Type	R/W Parameter
Description	Sets friction compensation value.
Units	A
Range	0 to IL.LIMITP
Default Value	0
Data Type	Float
See Also	IL.FF
Start Version	M_0-0-32

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	3422h/0
Data Type	
PDO Mappable	No
Start Version	M_00-00-62-000

Description

Position command derivative sign is multiplied by this value to be injected to the current command.

IL.IFOLD

General Information	
Type	R/O Parameter
Description	Reads the overall foldback current limit.
Units	A
Range	0 to 2,147,483.647 A
Default Value	N/A
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Description

Two current foldback algorithms run in parallel in the drive: the drive foldback algorithm and the motor foldback algorithm. Each algorithm uses different sets of parameters.

Each algorithm has its own foldback current limit, IL.DIFOLD and IL.MIFOLD. The overall foldback current limit is the minimum of the two at any given moment.

IL.IFOLD = min (IL.DIFOLD, IL.MIFOLD).

IL.DIFOLD is an artificial current, which can be higher or lower than the drive or motor peak current. When IL.IFOLD becomes lower than the existing current limit (e.g. IL.LIMITP), it becomes the active current limit.

IL.KACCFF

General Information	
Type	R/W Parameter
Description	Sets current loop acceleration feedforward gain value
Units	NA
Range	0.0 to 2.0
Default Value	0.0
Data Type	Float
See Also	IL.FF
Start Version	M_0-0-32

Description

This value sets the gain for the acceleration feedforward (a scaled second derivative of the position command is added to the current command value) .

This parameter is valid only in the position mode (DRV.OPMODE = 2).

IL.KBUSFF

General Information	
Type	RW
Description	Current loops fieldbus injected feed-forward gain
Units	NA
Range	0 to 2
Default Value	NA
Data Type	Float
See Also	IL.FF, IL.BUSFF
Start Version	M_0-0-32

Description

This parameter scales the feedforward term added by the fieldbus to the current command. The nominal feed-forward value can be multiplied by this gain value.

This parameter is only used in the position mode (DRV.OPMODE = 2).

IL.KP

General Information	
Type	NV Parameter
Description	Sets the proportional gain of the q-component of the PI regulator.
Units	V/A
Range	0 to 2,000 V/A
Default Value	Read from the motor or, if no memory, 50 V/A
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3598h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

IL.KP is used to modify the proportional gain of the PI-loop that controls the q-component of the current.

IL.KPDRATIO

General Information	
Type	NV Parameter
Description	Sets the proportional gain of the d-component current PI-regulator as a percentage of IL.KP
Units	N/A
Range	0 to 100
Default Value	1
Data Type	Float
See Also	IL.KP
Start Version	M_0-0-15

Description

This parameter allows the user to modify the proportional gain of the PI-loop, which controls the d-component of the current.

IL.KVFF

General Information	
Type	R/W
Description	Current loops velocity feed-forward gain
Units	NA
Range	0 to 2
Default Value	0
Data Type	Float
See Also	IL.FF
Start Version	M_0-0-32

Description

This parameter sets the gain for the velocity loop feedforward. The nominal feedforward value can be multiplied by this gain value.

This parameter is only used in position mode (DRV.OPMODE = 2).

IL.LIMITN

General Information	
Type	NV Parameter
Description	Sets the negative user (application) current limit.
Units	A
Range	Negative drive peak current to 0 A
Default Value	Negative drive peak current
Data Type	Float
See Also	IL.LIMITP
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	356Fh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter sets the negative user limitation of the q-component current command value. The real current command value can furthermore be limited by additional settings or calculations, such as an I^2t calculation or motor peak current.

IL.LIMITP

General Information	
Type	NV Parameter
Description	Sets the positive user (application) current limit.
Units	A
Range	0 A to drive peak current
Default Value	Drive peak current
Data Type	Float
See Also	IL.LIMITN
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	356Eh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter sets the positive user limitation of the q-component current command value. The real current command value can furthermore be limited by some additional settings or calculations such as I^2t calculation and motor peak current.

IL.MFOLDD

General Information	
Type	R/O Parameter
Description	Sets the motor foldback maximum time at motor peak current.
Units	s
Range	0.1 to 2400 s
Default Value	10 s
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Description

IL.MFOLDD sets the maximum time allowed for the motor to remain at peak current before starting to fold towards the motor continuous current. When at motor peak current, IL.MFOLDD is the amount of time before the foldback algorithm starts to reduce the current.

IL.MFOLDR

General Information	
Type	R/O Parameter
Description	Sets the motor foldback recovery time.
Units	s
Range	0.1 to 65,535 s
Default Value	Calculated from other foldback parameters.
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Description

IL.MFOLDR sets the recovery time for the motor foldback algorithm. If 0 current is applied for at least the recovery time duration, it is possible to apply motor peak current for the duration of IL.MFOLDD time.

The IL.MFOLDR value is automatically calculated from other foldback parameters.

IL.MFOLDT

General Information	
Type	R/O Parameter
Description	Sets the motor foldback time constant of the exponential current drop (foldback).
Units	s
Range	0.1 to 2,400 s
Default Value	10 s
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Description

IL.MFOLDT sets the time constant of the exponential drop (foldback) of the current towards motor continuous current.

IL.MIFOLD

General Information	
Type	R/O Parameter
Description	Sets the motor foldback current limit.
Units	A
Range	0 to 2147483.647 A
Default Value	N/A
Data Type	Float
See Also	Foldback
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35A4h/0
Data Type	Integer 32
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

IL.MIFOLD sets the output of the motor foldback algorithm. It is an artificial current, which can be higher or lower than the motor peak current. When IL.MIFOLD becomes lower than the existing current limit (IL.LIMITP) it becomes the active current limit.

IL.MIFOLD decreases when the actual current is higher than motor continuous current and increases (up to a certain level) when the actual current is lower than the motor continuous current.

IL.OFFSET

General Information	
Type	RW
Description	A constant current command added to compensate for gravity.
Units	A
Range	IL.LIMITN to IL.LIMITP
Default Value	0
Data Type	Float
See Also	IL.FF
Start Version	M_0-0-32

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	3423h/0
Data Type	
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This value will be added to the overall current loop feedforward value.

IL.VCMD

General Information	
Type	R/O Parameter
Description	Sets the output of the q-component PI regulator.
Units	Vrms
Range	0 Vrms to bus voltage
Default Value	N/A
Data Type	Integer
See Also	IL.VDCMD
Start Version	M_0-0-15

Description

Sets the output of the current loop that controls the q-component of the current.

IL.VUFB

General Information	
Type	R/O Parameter
Description	Reads the measured voltage on the u-winding of the motor.
Units	V
Range	–1200*VBusScale to +1200*VBusScale
Default Value	N/A
Data Type	Integer
See Also	IL.VVFB
Start Version	M_0-0-15

Description

The range for this parameter depends on whether the drive model is an MV/240 Vac or an HV/480 Vac.

The VBusScale parameter sets the drive model:

MV/240 Vac: VBusScale = 1

HV/480 Vac: VBusScale = 2

VBusScale must be used for multiple parameter ranges that are model dependent, such as IL.KP.

IL.VVFB

General Information	
Type	R/O Parameter
Description	Reads the measured voltage on the v-winding of the motor.
Units	V
Range	–1200*VBusScale to +1200*VBusScale
Default Value	N/A
Data Type	Integer
See Also	IL.VUFB
Start Version	M_0-0-15

Description

The range for this parameter depends on whether the drive model is an MV/240 Vac or an HV/480 Vac.

The VBusScale parameter sets the drive model:

MV/240 Vac: VBusScale = 1

HV/480 Vac: VBusScale = 2

VBusScale needs to be used for multiple parameter ranges that are model dependent such as IL.KP.

MOTOR Parameters

MOTOR.AUTOSET

General Information	
Type	NV Parameter
Description	Determines which drive parameters are calculated automatically.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_00-00-58-000

Description

This parameter determines whether or not certain drive parameters (for example, IL.KP or MOTOR.POLES) are calculated automatically. A value of 1 causes the parameters to be automatically calculated from the motor ID data (read from memory-supporting feedback devices, such as SFD, Endat, and BISS). Automatically calculated parameters are read-only. A value of 0 disables the automatic calculation and you must set the parameters manually. Manually set parameters are read-write.

MOTOR.BRAKE

General Information	
Type	NV Parameter
Description	Sets the presence or absence of a motor brake.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3587h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

The MOTOR.BRAKE parameter notifies the firmware whether a brake exists or not. It does not enable or disable the brake. If a brake is found to be present, the firmware considers hardware indications regarding the brake circuits (open circuit, short circuit, etc). If a brake does not exist, then the firmware ignores the hardware indications since they are irrelevant.

Value	Status
0	Motor brake does not exist.
1	Motor brake exists and brake hardware circuitry checks are enabled.

Enabling the MOTOR.BRAKE (value set to 1) when no motor brake exists creates a fault.

The motor brake is polled every 16 ms.

MOTOR.BRAKERLS

General Information	
Type	Command
Description	Allows a user to release the motor brake.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-41

Description

This command allows a user to release motor brake although the brake should be engaged.

0 = Drive controls the brake.

1 = Brake is released.

Note: There is a digital input mode used for the same purpose. The two mechanisms are independent.

MOTOR.BRAKESTATE

General Information	
Type	R/O Parameter
Description	Reads the actual status of the motor brake.
Units	N/A
Range	Brake closed or not present. Brake opened.
Default Value	Brake closed or not present.
Data Type	String
See Also	N/A
Start Version	M_0-0-42

Description

This parameter eads the actual status of the motor brake and can an only show two states:

1) Brake closed or not present

2) Brake open

MOTOR.CTF0

General Information	
Type	NV Parameter
Description	Sets the thermal constant of the motor coil.
Units	mHz
Range	0.265 to 16,000 mHz
Default Value	10 mHz
Data Type	Float
See Also	N/A
Start Version	M_00-00-62-000

Description

This parameter is used to configure the thermal constant of the motor coil, which is the break frequency of a single-pole low-pass filter model of the thermal dynamics of the motor coil.

This parameter, together with MOTOR.IPEAK and MOTOR.ICONT, determine the motor foldback parameters IL.MFOLDD,IL.MFOLDT, and IL.MFOLDR.

MOTOR.ICONT

General Information	
Type	NV Parameter
Description	Sets the motor continuous current.
Units	mA
Range	100 to 500,000 mA
Default Value	1,000 mA
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	358Eh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter is used to configure the motor continuous current.

MOTOR.IDDATAVALID

General Information	
Type	
Description	Reports the status of the motor memory.
Units	
Range	
Default Value	
Data Type	
See Also	
Start Version	

Description

MOTOR.IDDATAVALID reports the status of the motor memory status.

The valid values for this keyword are the following:

Value	Description
0	Error in identification
1	Success in identification
2	Identification in process
3	Identification not started yet
4	Success recognizing feedback, but failed to varify OEM data integrity

MOTOR.INERTIA

General Information	
Type	NV Parameter
Description	Sets the motor inertia.
Units	$kgcm^2$ for rotary motors kg for linear motors
Range	1 to 200,000 $kgcm^2$ or kg
Default Value	100 $kgcm^2$ or kg
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Description

This parameter sets the motor inertia.

MOTOR.IPEAK

General Information	
Type	NV Parameter
Description	Sets the motor peak current.
Units	mA
Range	200 to 1,000,000 mA
Default Value	2,000 mA
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	358Fh/0
Data Type	Integer 32
PDO Mappable	N/A
Start Version	M_00-00-62-000

Description

This parameter is used to configure the motor peak current.

MOTOR.KT

General Information	
Type	NV Parameter
Description	Sets the torque constant of the motor.
Units	Nm/A
Range	0.001 to 65 Nm/A
Default Value	0.1 Nm/A
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Description

This parameter is the torque constant of the motor in Nm/A.

The value can be online checked according to the following equation:

$Kt = 60 * \sqrt{3} * Ui / (2 * \pi * n)$

Ui = induced voltage of the motor
n = actual rotor velocity

MOTOR.LQLL

General Information	
Type	NV Parameter
Description	Sets the line-to-line motor Lq.
Units	mH
Range	1 to 2^{32} mH
Default Value	17,000 mH
Data Type	Float
See Also	N/A
Start Version	M_0-0-15

Description

This parameter is used to configure the motor line-to-line inductance.

MOTOR.NAME

General Information	
Type	NV Parameter
Description	Sets the motor name.
Units	N/A
Range	11 chars
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-15

Description

This parameter is used to set the motor name.

MOTOR.PHASE

General Information	
Type	NV Parameter
Description	Sets the motor phase.
Units	Electrical degrees
Range	0 to 360°
Default Value	0°
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

This parameter sets the motor phase.

MOTOR.PITCH

General Information	
Type	NV Parameter
Description	Sets the motor pitch.
Units	µm
Range	1,000 to 1,000,000 µm
Default Value	1,000 µm
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

This parameter defines the pole-to-pair pitch for the linear motor in micrometers.

MOTOR.POLES

General Information	
Type	NV Parameter
Description	Sets the number of motor poles.
Units	N/A
Range	0 to 128
Default Value	6
Data Type	Integer
See Also	FB1.POLES
Start Version	M_0-0-15

Description

MOTOR.POLES sets the number of motor poles. This command is used for commutation control and represents the number of individual magnetic poles of the motor (not pole pairs). The division value of motor poles (MOTOR.POLES) and feedback poles (FB1.POLES) must be an integer when setting drive to enable, otherwise a fault is issued.

MOTOR.R

General Information	
Type	NV Parameter
Description	Sets the stator winding resistance phase-phase in ohms.
Units	Ω
Range	0.001 to 650 Ω
Default Value	10 Ω
Data Type	Float
See Also	N/A
Start Version	M_0-0-15; Units changed in M_00-00-66-000

Description

MOTOR.R sets the stator winding resistance phase-to-phase in ohms.

MOTOR.RTYPE

General Information	
Type	NV Parameter
Description	Defines the type of thermal resistor inside the motor.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-63

Description

This parameter defines the type of thermal resistor used inside of the motor to measures motor temperature.

0 = PTC

1 = NTC

MOTOR.TBRAKEAPP

General Information	
Type	NV Parameter
Description	The delay time used for applying the motor brake.
Units	16 ms cycles
Range	0 to 1,000 16 ms cycles
Default Value	5 16 ms cycles
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	366Fh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter is used to configure the mechanical delay when applying the motor brake. Because this action occurs once every 16 ms, the unit is a multiple of 16 ms cycles.

MOTOR.TBRAKERLS

General Information	
Type	NV Parameter
Description	The delay time used for releasing the motor brake.
Units	16 ms cycles
Range	0 to 1,000 16 ms cycles
Default Value	5 16 ms cycles
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	366Eh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter is used to configure the mechanical delay when releasing the motor brake. Because this action occurs once every 16 ms, the unit is a multiple of 16 ms cycles.

MOTOR.TEMP

General Information	
Type	R/O Parameter
Description	Reads the motor temperature represented as the resistance of the motor PTC.
Units	Ω
Range	0 to 2^{32} Ω
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3612h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter is used to get the motor temperature which is represented as the resistance of the motor PTC.

MOTOR.TEMPFAULT

General Information	
Type	NV Parameter
Description	Sets the motor temperature fault level.
Units	Ω
Range	0 to 2,000,000,000 Ω
Default Value	0 Ω = switched off
Data Type	Integer
See Also	MOTOR.TEMP
Start Version	M_0-0-15

Description

This parameter is used to configure the motor temperature fault level as a resistance threshold of the motor PTC.

A zero value prevents any warning from being created.

MOTOR.TEMPWARN

General Information	
Type	NV Parameter
Description	Sets the motor temperature warning level.
Units	Ω
Range	0 to 2,000,000,000 Ω
Default Value	0 Ω = switched off
Data Type	Integer
See Also	MOTOR.TEMP
Start Version	M_0-0-15

Description

This parameter is used to configure the motor temperature warning level as a resistance threshold of the motor PTC.

A zero value prevents any warning from being created.

MOTOR.TYPE

General Information	
Type	NV Parameter
Description	Sets the motor type.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

MOTOR.TYPE sets the drive control algorithms to different motor types as follows:

0: Rotary motor

1: Linear motor

MOTOR.VMAX

General Information	
Type	NV Parameter
Description	Sets the maximum motor speed.
Units	rpm
Range	100 to 40,000 rpm
Default Value	3,000 rpm
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

This parameter is used to configure the maximum speed of the motor.

MOTOR.VOLTMAX

General Information	
Type	NV Parameter
Description	Sets the motor maximum voltage.
Units	Vrms
Range	110 to 900 Vrms
Default Value	230 Vrms
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

This parameter sets the maximum permissible motor voltage. For instance, if a motor that is rated for a 400 V supply is connected to the drive, then the MOTOR.VOLTMAX setting is 400. This value also sets regen and over voltage thresholds in the drive to acceptable values for the motor so that the motor windings are not damaged.

MT Parameters and Commands

MT.ACC

General Information	
Type	R/W Parameter
Description	Specifies motion task acceleration.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s², (PIN/POUT)/s², rad/s² Linear: counts/s², mm/s², µm/s², (PIN/POUT)/s²
Range	Rotary: 0.031 to 833,333.333 rps/s 1.860 to 50,000,000.000 rpm/s 11.158 to 300,000,000.000 deg/s² 0.155 to 4,166,666.752 (PIN/POUT)/s² 0.195 to 5,235,987.968 rad/s² Linear: 0.000 to 833.333 counts/s² 0.031*MOTOR.PITCH to 833,333.333*MOTOR.PITCH mm/s² 30.994*MOTOR.PITCH to 833,333,333.333*MOTOR.PITCHµm/s² 0.155 to 4,166,666.667 (PIN/POUT)/s²
Default Value	Rotary: 50.000 rps/s 3,000.000 rpm/s 18,000.000 deg/s² 250.000 (PIN/POUT)/s² 314.159 rad/s² Linear: 0.050 counts/s² 1.000*MOTOR.PITCH mm/s² 1000.000*MOTOR.PITCH µm/s² 250.000 (PIN/POUT)/s²
Data Type	Float
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	6083h/0

Fieldbus Information	
Data Type	Unsigned 32
PDO Mappable	Yes
Start Version	M_00-00-62-000

Description

MT.ACC specifies the motion task acceleration and is used by the MT.SET and MT.LOAD command. This parameter is a temporary value, since a motion task is only set after a MT.SET command. The motion task acceleration is further limited by the maximum allowed acceleration DRV.ACC

A value of 0 for MT.ACC should not be used when setting a motion task via MT.SET because this value causes a validity check of the MT.SET command to fail.

A value of 0 for MT.ACC after an MT.LOAD command displays an empty (not initialized) motion task.

MT.CLEAR

General Information	
Type	Command
Description	Clears motion tasks from the drive.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC,MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Description

MT.CLEAR clears a motion task from the drive. This command needs one argument in order to clear a motion task. A motion task consists of the following parameters: MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC,MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT

A value of –1 clears all motion tasks in the drive (MT.CLEAR –1).

Example

MT.CLEAR 5: Clear motion task number 5.

After performing a command such as MT.PARAMS 5, the drive displays the following:

```
5   0.000 Counts   0.000 rpm   0   0.000 rpm/s   0.000 rpm/s   0   0
0 ms
```

A value of 0 for velocity, acceleration, or deceleration displays motion task as uninitialized.

MT.CNTL

General Information	
Type	R/W Parameter
Description	Sets motion task control word.
Units	N/A
Range	0 to 4,294,967,295
Default Value	0
Data Type	Integer
See Also	MT.NUM , MT.P, MT.V, MT.ACCMT.V, MT.DEC, MT.TNUM, MT.MTNEXT MT.MTNEXT , MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	35B9h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

MT.CNTL specifies the motion task control word, which is used by the MT.SET and MT.LOAD commands. The control word describes the behavior of the motion task. This parameter is a temporary value, since a motion task is only set after an MT.SET command is issued.

Since this parameter is read bitwise, it can combine multiple functions into a single word. The meaning of each bit is described in the tables below.

Table 1: Motion Task (MT) Bit Descriptions

Bit	Meaning	Description
0	0x00001	See Table 2: MT Type.
1	0x00002	
2	0x00004	
3	0x00008	
4	0x00010	If this bit is 0, then the next MT is not executed. If this bit is 1, then the next MT is executed.
5	0x00020	See Table 3: Next MT Start Type.
6	0x00040	
7	0x00080	
8	0x00100	
9	0x00200	
10	0x00400	See Table 4: MT Acceleration Type.
11	0x00800	
12	0x01000	Activates the override functionality for a trapezoidal MT. If this bit is 1, a motion task with override functionality must be activated (see bit 5).

Table 2: MT Type

Bits 3, 2, 1, 0	Description
0000	Absolute MT. The target position is defined by the MT.P value.
1000	Absolute MT. The target position is defined by an external source, such as an analog input.
0001	Relative MT. The target position is defined as: Target position = PL.CMD + MT.P
0011	Relative MT. The target position is defined as: Target position = Target position of the last motion task + MT.P
0101	Relative MT. The target position is defined as: Target position = External start position + MT.P The ‘external start position’ can be generated by a latched position, analog input, and other sources.
0111	Relative MT. The target position is defined as: Target position = PL.FB + MT.P

Table 3: Next MT Start Type

Bits 9, 8, 7, 6, 5	Description
00000	Switches over to next MT after stopping. After an MT ends, the next MT starts immediately.
00001	Switches over to next MT after stopping and delay. After an MT ends, the MT following time (MT.TNEXTelapse in order to start the next MT.
00010	Switches over to next MT after stopping and external event. After an MT ends, an external event (such as a high digital input) must occur in order to start the next MT.
00011	Switches over to next MT after stopping, delay, and external event. After an MT ends, the MT.TNEXTmust elapse and an external event (such as a high digital input) must occur in order to start the next MT.
00111	Switches over to next MT after stopping, then delay or external event. After an MT ends, the MT.TNEXT must elapse or an external event (such as a high digital input) must occur in order to start the next MT.
10000	Switches over to the next MT at present MT speed (change on the fly). After reaching the target position of an MT, the next MT starts. The drive then accelerates with the adjusted acceleration ramp of this next MT to the target velocity of this next MT. The MT.TNEXT setting is ignored.
11000	Switches over to the next MT at next MT speed (change on the fly).When the target position of an MT is reached, the drive has already accelerated with the acceleration ramp of the next MT to the target velocity of the next MT. Thus, the drive begins the next MT at the next MT target velocity. The MT.TNEXT setting is ignored if adjusted.

Table 4: MT Acceleration Type

Bits 11, 10	Description
00	Trapezoidal acceleration and deceleration.

MT.CONTINUE

General Information	
Type	Command
Description	Continues a stopped motion task.
Units	N/A
Range	N/A
Default Value	0
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACCMT.V, MT.DEC, MT.TNUM, MT.MTNEXT MT.MTNEXT , MT.SET , MT.LOAD
Start Version	M_0-0-17

Description

MT.CONTINUE continues a motion task that has been stopped by the DRV.STOP command.

MT.DEC

General Information	
Type	R/W Parameter
Description	Motion task deceleration.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rps/s, rpm/s, deg/s², (PIN/POUT)/s², rad/s² Linear: counts/s², mm/s², µm/s², (PIN/POUT)/s²
Range	Rotary: 0.031 to 833333.333 rps/s 1.860 to 50000000.000 rpm/s 11.158 to 300000000.000 deg/s² 0.155 to 4166666.752 (PIN/POUT)/s² 0.195 to 5235987.968 rad/s² Linear: 0.000 to 833.333 counts/s² 0.031*MOTOR.PITCH to 833333.333*MOTOR.PITCH mm/s² 30.994*MOTOR.PITCH to 833333333.333*MOTOR.PITCH µm/s² 0.155 to 4166666.667 (PIN/POUT)/s²
Default Value	Rotary: 50.000 rps/s 3000.000 rpm/s 18,000.000 deg/s² 250.000 (PIN/POUT)/s² 314.159 rad/s² Linear: 0.050 counts/s² 1.000*MOTOR.PITCH mm/s² 1000.000*MOTOR.PITCH µm/s² 250.000 (PIN/POUT)/s²
Data Type	Float
See Also	MT.ACC, MT.NUM , MT.P, MT.V, MT.CNTL, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	6084h/0
Data Type	Unsigned 32
PDO Mappable	Yes
Start Version	M_00-00-62-000

Description

MT.DEC specifies the motion task deceleration and is used by the MT.SET and MT.LOAD commands. This parameter is a temporary value, since a motion task is only set after an MT.SET command is issued. The motion task deceleration is further limited by the maximum allowed acceleration, DRV.DEC.

A value of 0 for MT.DEC should not be used when setting a motion task via MT.SET because this value causes a validity check of the MT.SET command to fail.

A value of 0 for MT.DEC after an MT.LOAD command displays an empty (not initialized) motion task.

MT.EMERGMT

General Information	
Type	R/W Parameter
Description	Selects a motion task to be triggered after an emergency stop procedure.
Units	N/A
Range	1 to 128
Default Value	0
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Description

MT.EMERGMT selects the motion task to be triggered after an emergency stop procedure.

A value of –1 shows that no motion task must be started after a ramp-down procedure in a closed position loop mode of operation.

MT.LIST

General Information	
Type	Command
Description	Lists all initialized motion tasks in the drive.
Units	N/A
Range	0
Default Value	N/A
Data Type	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
See Also	M_0-0-17
Start Version	N/A

Description

MT.LIST reads every initialized motion task from the drive. A motion task consists of the following parameters: MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , and MT.TNEXT.

A motion task is considered as initialized as soon as MT.V, MT.ACC, and MT.DEC of that specific motion task have values not equal to 0.

MT.LOAD

General Information	
Type	Command
Description	Reads/loads a motion task number from the drive.
Units	N/A
Range	N/A
Default Value	0
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET
Start Version	M_0-0-17

Description

MT.LOAD reads out a motion task number MT.NUM from the drive. A motion task consists of the following parameters: MT.NUM, MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT. These parameters belong to the motion task number MT.NUM and are refreshed by MT.LOAD.

MT.MOVE

General Information	
Type	Command
Description	Starts a motion task.
Units	N/A
Range	N/A
Default Value	0
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Description

MT.MOVE starts a motion task. This command needs one argument in order to start a motion task. The drive must be homed, otherwise the motion task will not start (see also HOME commands).

Example

MT.MOVE 3 -> Start motion task number 3.

MT.MTNEXT

General Information	
Type	R/W Parameter
Description	Specifies following motion task number.
Units	N/A
Range	0 to 128
Default Value	0
Data Type	Integer
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35BCh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

MT.MTNEXT specifies the number of the following motion task and is used by the MT.SET and MT.LOAD command. This parameter is a temporary value. A motion task is only set after an MT.SET command.

The motion task control word can be selected so that a following motion task is executed after a first motion task. This parameter displays which motion task should be started after the first motion task.

MT.NUM

General Information	
Type	R/W Parameter
Description	Motion task number.
Units	N/A
Range	0 to 128
Default Value	0
Data Type	Integer
See Also	MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	365Bh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

MT.NUM specifies the motion task number, which is used by the MT.SET and MT.LOAD commands. This parameter is a temporary value. A motion task is only set after an MT.SET command is issued.

MT.P

General Information	
Type	R/W Parameter
Description	Motion task position.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR
Range	N/A
Default Value	0
Data Type	Float
See Also	MT.NUM , MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	607Ah/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

MT.P specifies the motion task position, which is used by the MT.SET and MT.LOAD command. Depending on the motion task control word (MT.CNTL), the MT.P command can either be the target position of the motion task or a relative distance. This parameter is a temporary value. A motion task is only set after an MT.SET command.

MT.PARAMS

General Information	
Type	Command
Description	Shows a motion task.
Units	N/A
Range	N/A
Default Value	0
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Description

MT.PARAMS displays a motion task. This command needs one argument in order to show a motion task. If you enter MT.PARAMS without an argument, the drive returns the current or last active motion task.

Example

MT.PARAMS 5

The drive responds as follows:

```
7   5222.000 Counts   135.000 rpm   1   550.746 rpm/s   654.458 rpm/s
0   0   0 ms
```

MT.SET

General Information	
Type	Command
Description	Sets the motion task in the drive.
Units	N/A
Range	N/A
Default Value	0
Data Type	N/A
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.LOAD
Start Version	M_0-0-17

Description

MT.SET sends a motion task to the drive. A motion task consists of the following parameters: MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , and MT.TNEXT.

The motion task number (MT.NUM) with the parameters above is sent to the drive only after the MT.SET command.

MT.TNEXT

General Information	
Type	R/W Parameter
Description	Specifies following motion task time.
Units	ms
Range	0 to 65,535 ms
Default Value	0 ms
Data Type	Integer
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35BDh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

MT.TNEXTspecifies the time that must elapse before starting a following motion task. This value is used by the MT.SET and MT.LOAD command. This parameter is a temporary value. A motion task is only set after an MT.SET command.

The motion task control word can be selected so that a following motion task is executed after a first motion task and this additional delay time.

MT.TNUM

General Information	
Type	R/W Parameter
Description	Motion task customer table number.
Units	N/A
Range	0 to 7
Default Value	0
Data Type	Integer
See Also	MT.NUM , MT.P, MT.V, MT.CNTL, MT.ACC, MT.DEC, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Description

MT.TNUM specifies the customer profile table and is used by the MT.SET and MT.LOAD command. This parameter is a temporary value. A motion task is only set after an MT.SET command.

The drive can have up to eight customer specific profile tables. The drive performs an S-curve acceleration with these profile tables. The shapes of these tables have an impact on the shape of the motion task acceleration and deceleration. The motion task control word specifies if a customer profile table is used or not.

MT.TPOSWND

General Information	
Type	R/W Parameter
Description	Motion task target position window.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR Rotary: counts, rad, deg, PIN/POUT, counts 16 bit Linear: counts, mm, µm, PIN/POUT, counts 16 bit
Range	N/A
Default Value	0.5 rev
Data Type	Float
See Also	DRV.MOTIONSTAT
Start Version	M_0-0-32

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35C6h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

Within DRV.MOTIONSTAT, MT.TPOSWND is used to indicate that the target position of a motion task has been reached. DRV.MOTIONSTAT displays a "Target Position Reached" bit as soon as the following statement becomes true:

abs(actual_position – target_position) < MT.TPOSWND

MT.TVELWND

General Information	
Type	R/W Parameter
Description	Motion task target velocity window
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: Counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: 0.000 to 12000.000 rpm 0.000 to 200.000 rps 0.000 to 72000.000 deg/s 0.000 to 1000.000 (PIN/POUT)/s 0.000 to 1256.637 rad/s Linear: 0.000 to 0.200 counts/s 0.000 to 200.000*MOTOR.PITCH mm/s 0.000 to 200,000.000*MOTOR.PITCH µm/sec 0.000 to 1000.000 (PIN/POUT)/s
Default Value	Rotary: 60.000 rpm 1.000 rps 359.999 deg/s 5.000 (PIN/POUT)/s 6.283 rad/s Linear: 0.001 Counts/s 1.000*MOTOR.PITCH mm/s 999.998*MOTOR.PITCH µm/sec 5.000 (PIN/POUT)/s
Data Type	Float
See Also	DRV.MOTIONSTAT
Start Version	M_0-0-32

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3856h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

Within DRV.MOTIONSTAT, MT.TVELWND is used to indicate that the target velocity of a motion task has been reached. DRV.MOTIONSTAT displays a "Target Velocity Reached" bit as soon as the following statement becomes true:

(target velocity – MT.TVELWND) < actual velocity < (target velocity + MT)

MT.V

General Information	
Type	R/W Parameter
Description	Motion task velocity.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: 0.000 to 12,000.000 rpm 0.000 to 200.000 rps 0.000 to 72,000.000 deg/s 0.000 to 1,000.000 (PIN/POUT)/s 0.000 to 1,256.637 rad/s Linear: 0.000 to 0.200 Counts/s 0.000 to 200.000*MOTOR.PITCH mm/s 0.000 to 200,000.000*MOTOR.PITCH µm/sec 0.000 to 1000.000 (PIN/POUT)/s
Default Value	0
Data Type	Float
See Also	MT.NUM , MT.P, MT.CNTL, MT.ACC, MT.DEC, MT.TNUM, MT.MTNEXT , MT.TNEXT, MT.SET , MT.LOAD
Start Version	M_0-0-17

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	6081h/0
Data Type	Unsigned 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

MT.V specifies the motion task velocity, which is used by the MT.SET and MT.LOAD command. This parameter is a temporary value. A motion task is only set after an MT.SET command. The motion task velocity is furthermore limited by VL.LIMITP or VL.LIMITN depending on the direction of the motion task.

A value of 0 should not be used when setting a motion task via MT.SET because this value causes a validity check of the MT.SET command to fail.

A value of 0 after an MT.LOAD command displays an empty (not initialized) motion task.

MT.VCMD

General Information	
Type	R/O Parameter
Description	Derivative of PL.CMD.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR
Range	N/A
Default Value	N/A
Data Type	Float
See Also	N/A
Start Version	M_00-00-63-000

Description

MT.VCMD returns the derivative of the position loop trajectory (PL.CMD), which is therefore a velocity. MT.VCMD is updated while the drive is in DRV.OPMODE 2 and is processing the following motion types:

- Motion tasking
- Homing
- Electronic gearing
- Service motion
- External trajectory coming from a fieldbus
- External trajectory calculated from an analog input signal

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PL Parameters

PL.CMD

General Information	
Type	NV Parameter
Description	Reads the position command directly from the entry to the position loop.
Units	Depends on UNIT.PROTARY or UNIT.PLINEARUNIT.ACCLINEAR Rotary: counts, rad, deg, (PIN/POUT), counts 16 Bit Linear: counts, mm, µm, (PIN/POUT), counts 16 Bit
Range	N/A
Default Value	N/A
Data Type	Float
See Also	PL.FB
Start Version	M_0-0-15

Description

PL.CMD returns the position command as it is received in the position loop entry.

PL.ERR

General Information	
Type	NV Parameter
Description	Returns the position following an error.
Units	counts, rad, deg, (PIN/POUT)
Range	N/A
Default Value	N/A
Data Type	Float
See Also	PL.FB
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	60F4h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

PL.ERR returns the position following an error.

PL.ERRFTHRESH

General Information	
Type	NV Parameter
Description	Sets the maximum position error.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: counts, rad, deg, (PIN/POUT), counts 16 Bit Linear: counts, mm, µm, (PIN/POUT), counts 16 Bit
Range	Rotary: 0.000 to 5,123,372,000,000,005.000 counts 0.000 to 7,495,067.136 rad 0.000 to 429,436,076.032 deg 0.000 to 5,964,389.888 (PIN/POUT) 0.000 to 78,176,452,636.718 counts 16 Bit Linear: 0.000 to 5,123,372,000,000,005.000 counts 0.000 to 1,192,877.952*MOTOR.PITCH mm 0.000 to 1,192,878,014.464*MOTOR.PITCH µm 0.000 to 5,964,389.888 (PIN/POUT) 0.000 to 78,176,452,636.718 counts 16 Bit
Default Value	0.000
Data Type	Float
See Also	PL.ERR
Start Version	M_0_0_33

Fieldbus Information	
	EtherCAT COE & CANOpen
Index/Subindex or Parameter Number	35C7h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

This parameter sets the maximum position error. If the position error PL.ERR is larger than PL.ERRFTHRESH the drive generates a fault. If PL.ERRFTHRESH is set to 0, the maximum position error is ignored.

Example

Set position rotary units to 2 (degrees). Setting PL.ERRFTHRESH to 1000 states that is the position error is larger than 1000 degrees, the drive will generate a fault.

UNIT.PROTARY 2

PL.ERRFTHRESH 1000

PL.ERRWTHRESH

General Information	
Type	NV Parameter
Description	Sets the position error warning level.
Units	Depends on UNIT.PROTARY or UNIT.PLINEARUNIT.ACCLINEAR Rotary: counts, rad, deg, (PIN/POUT), counts 16 Bit Linear: counts, mm, µm, (PIN/POUT), counts 16 Bit
Range	Rotary: 0.000 to 5,123,372,000,000,005.000 counts 0.000 to 7,495,067.136 rad 0.000 to 429,436,076.032 deg 0.000 to 5,964,389.888 (PIN/POUT) 0.000 to 78,176,452,636.718 counts 16 Bit Linear: 0.000 to 5,123,372,000,000,005.000 counts 0.000 to 1,192,877.952*MOTOR.PITCH mm 0.000 to 1,192,878,014.464*MOTOR.PITCH µm 0.000 to 5,964,389.888 (PIN/POUT) 0.000 to 78,176,452,636.718 counts 16 Bit
Default Value	0.000 deg
Data Type	Float
See Also	PL.ERR
Start Version	M_0-0-51

Description

If this value is not equal 0 and the position error PL.ERR is larger than this value, the drive will generate a warning.

If PL.ERRWTHRESH is set to 0 the warning is not issued.

Example

Set position rotary units to 2 degrees. If you set PL.ERRWTHRESH to 100 and the position error is larger than 100 degrees, then the drive will generate a warning.

UNIT.PROTARY 2

PL.ERRWTHRESH 100

PL.FB

General Information	
Type	R/O Parameter
Description	Reads the position feedback value.
Units	Depends on UNIT.PROTARY or UNIT.PLINEARUNIT.ACCLINEAR Rotary: counts, rad, deg, (PIN/POUT), counts 16 Bit Linear: counts, mm, µm, (PIN/POUT), counts16 bit
Range	N/A
Default Value	N/A
Data Type	Float
See Also	FB1.OFFSET
Start Version	M_0-0-15

Description

PL.FB returns the position feedback value.

Note that this value is not the pure feedback value read from the feedback device, but also includes the value of the FB1.OFFSET and an internal offset set automatically by the FW when a homing switch is actuated.

PL.FBSOURCE

General Information	
Type	NV Parameter
Description	Sets the feedback source for the position loop.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	VL.FBSOURCE
Start Version	M_00-00-51-000

Description

This parameter determines the feedback source to be used by the position loop. A value of 0 selects the primary feedback, 1 selects the secondary feedback.

PL.INTINMAX

General Information	
Type	NV Parameter
Description	Limits the input of the position loop integrator by setting the input saturation.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR Rotary: counts, rad, deg, (PIN/POUT), counts 16 Bit Linear: counts, mm, µm, (PIN/POUT), counts16 Bit
Range	Rotary: 0.000 to 18,446,744,073,709.000 counts 0.000 to 26,986.052 rad 0.000 to 1,546,188.288 deg 0.000 to 21,474.836 (PIN/POUT) 0.000 to 281,474,976.710 counts 16 Bit Linear: 0.000 to 18,446,744,073,709.000 counts 0.000 to 4,294.968*MOTOR.PITCH mm 0.000 to 4,294,967.296*MOTOR.PITCH µm 0.000 to 21,474.836 (PIN/POUT) 0.000 to 281,474,976.710 counts 16 Bit
Default Value	Rotary: 5,000,000.000 counts 0.007 rad 0.419 deg 0.006 (PIN/POUT) 76.293 counts 16 Bit Linear: 5,000,000.000 counts 4,294.968*MOTOR.PITCH mm 4,294,967.296*MOTOR.PITCH µm 0.006 (PIN/POUT) 76.293 counts 16 Bit
Data Type	Float
See Also	PL.FB
Start Version	M_0-0-15

Description

PL.INTINMAX limits the input of the position loop integrator by setting the input saturation. When used in concert with PL.INSATOUT, this variable allows you to make the position loop integrator effective near the target position. Far from the target position, however,the integrator is not dominant in the loop dynamics.

PL.INTOUTMAX

General Information	
Type	NV Parameter
Description	Limits the output of the position loop integrator by setting the output saturation.
Units	Depends on UNIT.PROTARY or UNIT.PLINEAR Rotary: counts, rad, deg, (PIN/POUT), counts 16 Bit Linear: counts, mm, µm, (PIN/POUT), counts 16 Bit
Range	Rotary: 0.000 to 18,446,744,073,709.000 counts 0.000 to 26,986.052 rad 0.000 to 1,546,188.288 deg 0.000 to 21,474.836 (PIN/POUT) 0.000 to 281,474,976.710 counts16 bit Linear: 0.000 to 18,446,744,073,709.000 counts 0.000 to 4,294.968*MOTOR.PITCH mm 0.000 to 4,294,967.296*MOTOR.PITCH µm 0.000 to 21,474.836 (PIN/POUT) 0.000 to 281,474,976.710 counts16 bit
Default Value	Rotary: 5,000,000.000 counts 0.007 rad 0.419 deg 0.006 (PIN/POUT) 76.293 counts 16 Bit Linear: 5,000,000.000 counts 4,294.968*MOTOR.PITCH mm 4,294,967.296*MOTOR.PITCH µm 0.006 (PIN/POUT) 76.293 counts16 bit
Data Type	Float
See Also	PL.INTINMAX
Start Version	M_0-0-14

Description

PL.INTOUTMAX limits the output of the position loop integrator by setting the output saturation.

When used in concert with PL.INTINMAX, this variable allows you to make the position loop integrator effective near the target position. Far from the target position, however, the integrator is not dominant in the loop dynamics.

PL.KI

General Information	
Type	NV Parameter
Description	Sets the integral gain of the position loop.
Units	kHz
Range	0 to 2,147,483.008 kHz
Default Value	0 kHz
Data Type	Float
See Also	PL.KP, PL.KD
Start Version	M_0-0-15

Description

PL.KI sets the integral gain of the position regulator PID loop.

PL.KP

General Information	
Type	NV Parameter
Description	Sets the proportional gain of the position regulator PID loop.
Units	(rev/s)/rev
Range	0 to 2,147,483.008 (rev/s)/rev
Default Value	100 rps/rev
Data Type	Float
See Also	PL.KI, PL.KD
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3542h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

PL.KP sets the proportional gain of the position regulator PID loop.

PLS Parameters and Commands

PLS.CLR

General Information	
Type	W/O Parameter
Description	Defines which position register to clear.
Units	N/A
Range	0 to 65,535
Default Value	0
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter clears bits inside of PLS.STATE.

Example

If PLS.CLR Bit 0=1, then Bit 0 in PLS.STATE is set to 0.

If PLS.CLR Bit 15=1, then Bit 15 in PLS.STATE is set to 0.

PLS.EN

General Information	
Type	R/W Parameter
Description	Enables the position registers.
Units	N/A
Range	0 to 65,535
Default Value	0
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter enables the position register switches.

Example

Bit 0 = 0: Disable PLS.P01

Bit 0 = 1: Enable PLS.P01

Bit15 = 0: Disable PLS.P16

Bit15 = 1: Enable PLS.P16

PLS.MODE

General Information	
Type	NV Parameter
Description	Selects position register mode.
Units	N/A
Range	0 to 65,535
Default Value	0
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

This variable is responsible for selecting the functionality of the position register switches.

Example

PLS.MODE 0: PLS.P01 is triggered once.

PLS.MODE 1: PLS.P01 is monitored continuously.

Bit15 = 0: PLS.P16 is triggered once.

Bit15 = 1: PLS.P16 is monitored continuously.

PLS.P01 TO PLS.P16

General Information	
Type	NV Parameter
Description	Position register compare value.
Units	Position units
Range	-5,188,146,770,730,811 to 5,188,146,770,729,811
Default Value	0
Data Type	S64
See Also	UNIT.PROTARY, UNIT.PLINEAR
Start Version	M_0-0-50-0

Description

These parameters contain the compare register value for the position register switches.

PLS.POLARITY

General Information	
Type	NV Parameter
Description	Sets the polarity of the position registers.
Units	N/A
Range	0 to 65,536
Default Value	0
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter selects the polarity of the position register switches.

Example

Bit 0 = 0: PLS.P01 is active if PL.FB > PLS.P01.

Bit 0 = 1: PLS.P01 is active if PL.FB < PLS.P01.

Bit15 = 0: PLS.P16 is active if PL.FB > PLS.P16.

Bit15 = 1: PLS.P16 is active if PL.FB < PLS.P16.

PLS.STATE

General Information	
Type	R/O Parameter
Description	Reads the status of the position registers.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter reads the status word of the position register switches. The status word indicates the result of the compare between the position register switch compare register and the actual position of the position loop.

Example

Bit 0 = 0: PLS.P01 is not active.

Bit 0 = 1: PLS.P01 is active.

Bit 15 = 0: PLS.P16 is not active.

Bit 15 = 1: PLS.P16 is active.

REC Parameters and Commands

REC.ACTIVE

General Information	
Type	R/O Parameter
Description	Indicates if data recording is in progress (active).
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Boolean
See Also	REC.DONE, REC.OFF
Start Version	M_0-0-16

Description

REC.ACTIVE indicates whether or not data recording is in progress. This action means that the trigger was met and the recorder is recording all data.

REC.CH1 to REC.CH6

General Information	
Type	R/W Parameter
Description	Sets recording channels 1 to 6.
Units	N/A
Range	N/A
Default Value	CH1 = IL.FB CH2 = IL.CMD CH3 = VL.FB CH4 = Empty CH5 = Empty CH6 = Empty
Data Type	String
See Also	REC.TRIG
Start Version	M_0-0-16

Description

REC.CHx specifies the recording channels.

There are 3 options to set the recording channels values:

- Set 0, CLR, or CLEAR. This setting clears the recording channel.
- Set one of the recordable commands. The list of recordable commands can be obtain by executing REC.RECPRMLIST.
- Set an internal value or variable of the drive (same as for DRV.MEMADDR input).

REC.DONE

General Information	
Type	R/O Parameter
Description	Checks whether or not the recorder has finished recording.
Units	N/A
Range	0 to 1
Default Value	N/A
Data Type	Boolean
See Also	REC.ACTIVE, REC.OFF
Start Version	M_0-0-14

Description

REC.DONE indicates that the recorder has finished recording.

This value is reset to 0 when the recorder trigger is set.

This value is reset by the system when the recording has finished or when REC.OFF is executed.

REC.GAP

General Information	
Type	R/W Parameter
Description	Specifies the gap between consecutive samples.
Units	N/A
Range	1 to 65,535
Default Value	1
Data Type	Integer
See Also	REC.TRIG
Start Version	M_0-0-16

Description

REC.GAP specifies the gap between consecutive samples. The recording base rate is 16 kHz, thus a gap of 1 means that a sample is recorded every 62.5 us.

REC.NUMPOINTS

General Information	
Type	R/W Parameter
Description	Sets the number of points to record.
Units	N/A
Range	1 to 65,535
Default Value	1,000
Data Type	Integer
See Also	REC.TRIG
Start Version	M_0-0-16

Description

REC.NUMPOINTS specifies the number of points (samples) to record.

REC.OFF

General Information	
Type	R/W Parameter
Description	Turns the recorder OFF.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	REC.ACTIVE, REC.DONE, REC.READY
Start Version	M_0-0-15

Description

REC.OFF turns the recorder off. In order to set the recorder again, the recorder must first be armed and then a trigger set.

REC.RECPRMLIST

General Information	
Type	R/O Parameter
Description	Reads the list of recordable parameters.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	REC.CH1 to REC.CH6
Start Version	M_0-0-50-0

Description

This command returns the list of recordable parameters. You can use recordable parameter as an input to any of the recording channels.

Note that an internal address or a registered variable can be used as input to any of the channels in addition to the list.

REC.RETRIEVE

General Information	
Type	R/O Parameter
Description	Transfers all the recorded data to the communication channel.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	String
See Also	N/A
Start Version	M_0-0-14

Description

REC.RETRIEVE causes the drive to transfer all the recorded data to the communication channel.

Example

The following format is the retrieve reply format (for N samples, G sample gap, and M parameters, where M<=6):

```
Recording

<N>,<G>

<parameter name 1> … <parameter name M>

Value11 … Value1M

Value N1 …  ValueNM
```

REC.RETRIEVEDATA

General Information	
Type	R/W Parameter
Description	Retrieves the recorded data without the header.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	REC.RETRIEVE, REC.RETRIEVEHDR, REC.RETRIEVESIZE
Start Version	M_0-0-50-0

Description

REC.RETRIEVEDATA retrieves a section of recorded data according to REC.RETRIEVESIZE from the received index; if no index is received, the drive retrieves the data from next section. An index is supplied to enable multiple retrieves and to give better control on the buffer in case of overflow. If no index or a negative value is present, then the index is ignored.

WorkBench uses this parameter to retrieve the data continuously for RT recoding.

The size of the data returned by this command depends on the number set by REC.RETRIEVESIZE.

Use REC.RETRIEVE for complete recording information view.

Notes:

- If REC.RETRIEVESIZE is larger than the buffer size, then it simply returns the whole buffer (no error).
- If the index is received, the data will be continuously returned starting from the given index (default starting index is 0).
- If the index is out of the bounds of the buffer, then it will be ignored.
- If recorder is active and REC.STOPTYPE==0, then this parameter returns an error.
- If REC.STOPTYPE==1, then this parameter returns the next section of data in the buffer (even if it reached the end of the buffer, it will return to the beginning of the buffer and add the data from index 0.)
- If REC.STOPTYPE==1 and the retrieve is too slow (gets overrun by the recorder), an overflow error message is returned instead of the retrieved data.
- If REC.STOPTYPE==0 and no index is received, continuously send the sections of data until the end of the buffer is reached. Then, return to the beginning of buffer and continue.
- A new REC.TRIG command automatically sets the index to 0.

Example

The following example retrieves data from index 100 in the size of 10 (hence places 100 to 109 in the buffer)

```
REC.NUMPOINTS 1000

REC.RETRIVESIZE 10

REC.TRIG

REC.RETRIEVEDATA 100
```

REC.RETRIEVEHDR

General Information	
Type	R/O Parameter
Description	Retrieves the recorded header without the data.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	REC.RETRIEVE, REC.RETRIEVEDATA
Start Version	M_0-0-50-0

Description

This command retrieves the recorded header without the data of the recording.

WorkBench uses this parameter to retrieve the header once before continuously reading the data for RT recoding.

Use REC.RETRIEVE for complete recording information view.

Example

REC.RETRIEVEHDR

REC.RETRIEVESIZE

General Information	
Type	R/W Parameter
Description	Sets the number of samples that REC.RETRIEVEDATA returns.
Units	recorder samples
Range	0 to 65,535 recorder samples
Default Value	1,000 recorder samples
Data Type	Integer
See Also	REC.RETRIEVEDATA, REC.RETRIEVEHDR
Start Version	M_0-0-50-0

Description

This parameter sets the number of samples that REC.RETRIEVEDATA returns.

WorkBench also uses this parameter to set the number of samples returned when retrieving the data continuously for RT recoding.

Use REC.RETRIEVE for the complete recording information view.

Example

```
REC.RETRIVESIZE 2000
```

REC.STOPTYPE

General Information	
Type	R/W
Description	Sets the recorder stop type.
Units	N/A
Range	0 or 1
Default Value	0
Data Type	Integer
See Also	REC.RETRIEVEDATA, REC.RETRIEVESIZE
Start Version	M_0-0-50-0-0

Description

This parameter sets the stop type for the recording.

0 = Recorder runs, continuously filling the recording circular buffer.

1 = Recorder fills in the buffer once.

To stop RT recording, execute REC.OFF.

Example

REC.STOPTYPE

REC.TRIG

General Information	
Type	Command
Description	Triggers the recorder.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	REC.RETRIEVE, REC.OFF
Start Version	M_0-0-16

Description

REC.TRIG starts the trigger and effectively starts recording values while waiting for the trigger to occur.

REC.TRIG sets the value of REC.DONE to 0.

After calling REC.TRIG, the data that was recorded by previous recording is deleted and cannot be retrieved.

No REC parameters can be set after a call to REC.TRIG until the recorder has finished or until REC.OFF is executed.

REC.TRIGPARAM

General Information	
Type	R/W Parameter
Description	Sets the parameter that triggers the recorder.
Units	N/A
Range	N/A
Default Value	IL.FB
Data Type	String
See Also	REC.TRIG
Start Version	M_0-0-14

Description

REC.TRIGPARAM sets the parameter on which the recorder triggers.

This parameter is only used when REC.TRIGTYPE = 2.

Input values are:

1. One of the set drive parameters list that can be set as a trigger. The available parameters for trigger are: PL.ERR, PL.CMD, PL.FB, VL.CMD, VL.FB, IL.CMD, and IL.FB.

2. Internal value or variable of the drive (same as for DRV.MEMADDR input).

REC.TRIGPOS

General Information	
Type	R/W Parameter
Description	Sets the position in the recording buffer in which to set the trigger.
Units	%
Range	1 to 100%
Default Value	10%
Data Type	Integer
See Also	REC.TRIG, REC.NUMPOINTS
Start Version	M_0-0-16

Description

REC.TRIGPOS sets the position in the recording buffer in which to set the trigger. The recording buffer size is defined by REC.NUMPOINTS.

The input value is a percentage of the buffer (that is, a value of 10 means saving 10% of the buffer data before the trigger occurs and 90% after it occurs).

This parameter is only used when REC.TRIGTYPE = 0.

REC.TRIGPRMLIST

General Information	
Type	R/O Parameter
Description	Reads the list of possible trigger parameters.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	REC.TRIGPARAM
Start Version	M_0-0-50-0

Description

This command returns the list of trigger parameters. Each one of those parameters can serve as the trigger parameter (input to REC.TRIGPARAM).

Note that an internal address or a registered variable can be used as input to REC.TRIGPARAM in addition to the list that this parameter returns.

Example

REC.TRIGPRMLIST

REC.TRIGSLOPE

General Information	
Type	R/W Parameter
Description	Sets the trigger slope.
Units	0 = Negative 1 = Positive
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	REC.TRIG, REC.NUMPOINTS
Start Version	M_0-0-16

Description

REC.TRIGSLOPE sets the recorder trigger slope.

This parameter is only used when REC.TRIGTYPE = 2.

REC.TRIGTYPE

General Information	
Type	R/W Parameter
Description	Sets the trigger type.
Units	0 = immediate 1 = command 2 = parameter
Range	0 to 2
Default Value	0
Data Type	Integer
See Also	REC.TRIG, REC.TRIGPARAM, REC.TRIGVAL, REC.TRIGSLOPE REC.TRIGPOS
Start Version	M_0-0-16

Description

REC.TRIGTYPE sets the type of trigger.

Input values are as follows:

Value	Description
0	Recording starts immediately
1	Recording starts on the next command executed through the TCP/IP. The trigger location in the buffer is set according to REC.TRIGPOS.
2	Recording starts per the values of REC.TRIGPARAM, REC.TRIGVAL, REC.TRIGSLOPE, and REC.TRIGPOS.

REC.TRIGVAL

General Information	
Type	R/W Parameter
Description	Sets the trigger value.
Units	The units of the parameter are chosen according to the unit type.
Range	0 to 2
Default Value	0
Data Type	Integer
See Also	REC.TRIG, REC.TRIGPARAM, REC.TRIGVAL, REC.TRIGSLOPE, REC.TRIGPOS
Start Version	M_0-0-16

Description

REC.TRIGVAL is the value that must be met by REC.TRIGPARAM for the trigger to occur.

Note that the units of this parameter are set according to the units of REC.TRIGPARAM.

REGEN Parameters

REGEN.POWER

General Information	
Type	R/O parameter
Description	
Units	Watt
Range	N/A
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_00-00-52-000

Description

Gets regen resistor's calcultaed power. ((V^2 / R) * DutyCycle)

REGEN.REXT

General Information	
Type	NV Parameter
Description	Sets the external, user-defined regen resistor resistance.
Units	Ω
Range	0 to 255 Ω
Default Value	0 Ω
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

REGEN.REXT sets the external user-defined regen resistor resistance. This variable is needed for the regen resistor temperature estimation algorithm.

REGEN.TEXT

General Information	
Type	R/W Parameter
Description	External regen resistor thermal protection time constant.
Units	s
Range	0.1 to 1,200 s
Default Value	100 s
Data Type	Float
See Also	REGEN.WATTEXT, REGEN.REXT
Start Version	

Description

REGEN.TEXT is a thermal time constant used to protect an external regeneration (braking) resistor from overheating and failing. It is the time-to-fault when input power steps from 0 to 150% of REGEN.WATTEXT. The drive's regen resistor protection algorithm continuously calculates the power dissipated in the resistor and processes that power value through a single pole low pass filter to model the resistor's thermal inertia. When the filtered regen power on the output of the filter exceeds REGEN.WATTEXT, a fault occurs. REGEN.TEXT sets the time constant of this thermal inertia filter.

REGEN.TEXT can often be found directly on power resistor data sheets. Just look for the peak overload curve and find the safe allowed time to be at 150% of the resistor's continuous power rating. Another way power resistors peak overload capability is often specified is by giving the energy rating in joules of the resistor. If you have the energy rating E then:

REGEN.TEXT = (1.1)*((joule limit)/REGEN.WATTEXT)

Example:

The external regen resistor is rated for 250 W continuous, is 33 ohm, and has a joule rating of 500 joules. To use this resistor, the drive settings become:

REGEN.TYPE = -1 (External Regen)

REGEN.REXT = 33

REGEN.WATTEXT = 250

REGEN.TEXT = (1.1)*(500 j)/(250 W) = 2.2 sec

1.3 Regen Resistor Type

Parameter: REGEN.TYPE

General Information	
Type	NV Parameter
Function	Sets the regen resistor type.
WorkBench Location (Screen/Dialog Box)	Power/Regen Resistor Type
Units	N/A
Range	–1 to 0
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3412h/0
Data Type	Integer 8
PDO Mappable	N/A
Start Version	

Description

You can specify a user-defined external regen resistor, select an internal regen resistor, or choose from a list of predefined regen resistors. The values for REGEN.TYPE are shown below:

Type	Description
–1	External user-defined regen resistor
0	Internal regen resistor

If you specify a user-defined regen resistor, then you must also define this resistor's resistance (REGEN.REXT), heatup time (REGEN.REXT), and power (REGEN.WATTEXT).

For more information on regen resistors, see Regeneration and Sizing a Regen Resistor.

REGEN.WATTEXT

General Information	
Type	R/W parameter
Description	
Units	W
Range	0 to 62,000 W
Default Value	1000 W
Data Type	Integer
See Also	N/A
Start Version	M_00-00-53-000

Description

Gets/Sets the regen resistor's power fault level for an external regen resistor (when REGEN.TYPE = -1) Above this fault level regen resistor's PWM wil be 0 and a fault will be issued.

SM Parameters

SM.ACCTYPE

General Information	
Type	R/W Parameter
Description	Sets the service motion acceleration and deceleration type.
Units	N/A
Range	0 to 8
Default Value	0
Data Type	Float
See Also	SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V1, SM.V2, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

The SM.ACCTYPE parameter describes the behavior of the acceleration ramp for the service motion modes 4 and 5 (see SM.MODE for details regarding these modes).

Values:

0 = Trapezoidal acceleration/deceleration

1 through 8 = Acceleration according to customer profile tables 1 through 8 (as available)

SM.I1

General Information	
Type	R/W Parameter
Description	Sets service motion current 1.
Units	A
Range	–Drive peak current to +Drive peak current
Default Value	0.025 · Drive peak current
Data Type	Float
See Also	SM.ACCTYPE, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V1, SM.V2, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

SM.I1 defines the current that is used in service motion modes 0 and 1 (see SM.MODE).

SM.I2

General Information	
Type	R/W Parameter
Description	Sets service motion current 2.
Units	–Drive peak current to +Drive peak current
Range	0.025 · Drive peak current
Default Value	Float
Data Type	SM.ACCTYPE, SM.I1, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V1, SM.V2, SM.VPM1, SM.VPM2
See Also	M_0-0-16
Start Version	–Drive peak current to +Drive peak current

Description

SM.I2 defines the current that is used in service motion mode 1 (see SM.MODE).

SM.MODE

General Information	
Type	R/W Paramete
Description	Sets service motion mode.
Units	N/A
Range	0 to 5
Default Value	4
Data Type	Integer
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MOVE, SM.T1 SM.T2, SM.V1, SM.V2, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

SM.MODE defines the mode of service motion for each loop. Two types of service motion are available :

1. A constant motion in one direction (endless or for a certain amount of time).
2. An alternating motion.

The six possible modes are described in the following table:

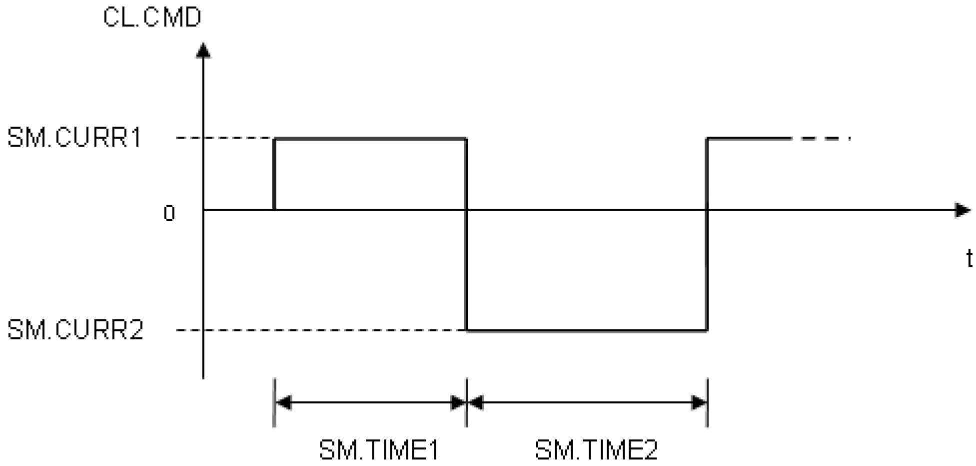
SM.MODE	Description	Requirements
0	Constant motion in closed current loop mode of operation. The drive generates a constant current command value (SM.I1) for a certain amount of time (if SM.T1>0) or endless (if SM.T1=0). The service motion can be stopped by using the DRV.STOP command.	DRV.OPMODE = 0 DRV.CMDSOURCE = 0
1	Alternating motion in closed current loop mode of operation. The drive generates a current command value (SM.I1) for a certain amount of time (SM.T1). Afterwards the drive generates a current command value (SM.I2) for another certain amount of time (SM.T2). This sequence is repeated as long as a DRV.STOP command occurs.	DRV.OPMODE = 0 DRV.CMDSOURCE = 0 SM.T1 > 0
2	Constant motion in closed velocity loop mode of operation. The drive generates a constant velocity command value (SM.V1) for a certain amount of time (if SM.T1>0) or endless (if SM.T1=0). The service motion can be stopped by using the DRV.STOP command.	DRV.OPMODE = 1 DRV.CMDSOURCE = 0

SM.MODE	Description	Requirements
3	Alternating motion in closed velocity loop mode of operation. The drive generates a velocity command value (SM.V1) for a certain amount of time (SM.T1). Afterwards the drive generates a velocity command value (SM.V2) for another certain amount of time (SM.T2). This sequence is repeated as long as a DRV.STOP command occurs.	DRV.OPMODE = 1 DRV.CMDSOURCE = 0 SM.T1 > 0
4	Constant motion in closed position loop mode of operation. The drive generates a trajectory for the position loop by reaching a constant velocity command value (SM.VPM1) for a certain amount of time (if SM.T1>0) or endless (if SM.T1=0). The service motion can be stopped by using the DRV.STOP command.	DRV.OPMODE = 2 DRV.CMDSOURCE = 0
5	Alternating motion in closed position loop mode of operation. The drive generates a trajectory for the position loop by reaching a constant a velocity command value (SM.VPM1) for a certain amount of time (SM.T1). Afterwards the drive generates a trajectory for the position loop by reaching a constant velocity command value (SM.VPM2) for another certain amount of time (SM.T2). This sequence is repeated as long as a DRV.STOP command occurs.	DRV.OPMODE = 2 DRV.CMDSOURCE = 0 SM.T1 > 0

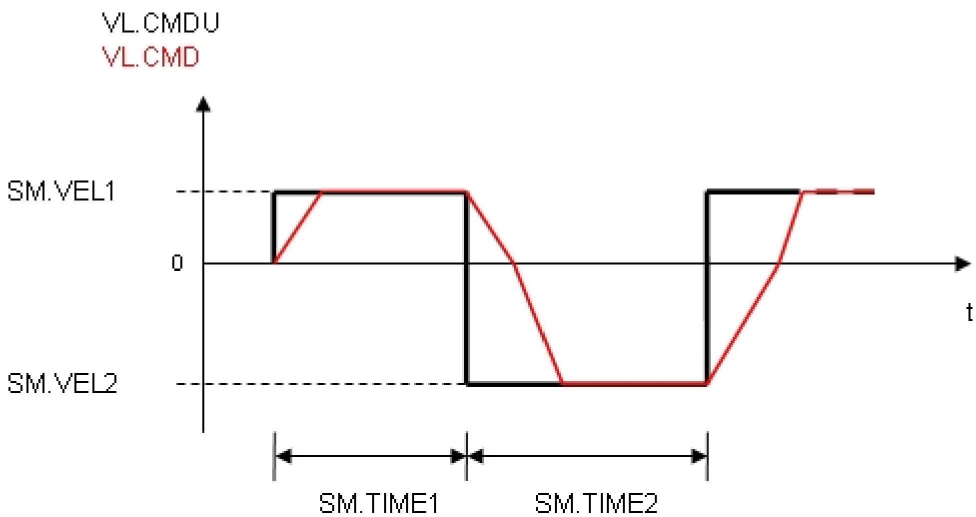
Ramps

The drive uses DRV.ACC and DRV.DEC for the ramps in service motion modes 2, 3, 4, and 5. The drive does not generate any ramps in service motion modes 0 and 1.

Service Motion Mode 1

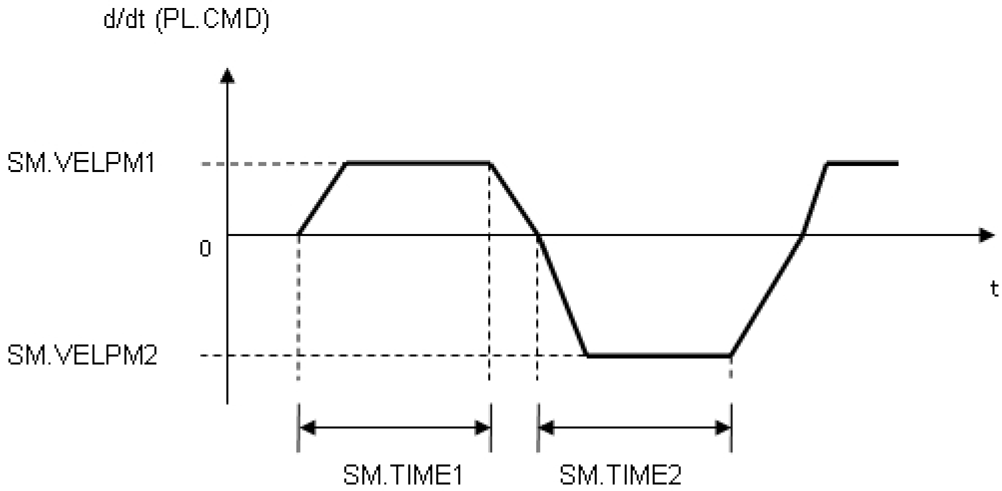


Service Motion Mode 3



SM.T1 or SM.T2 contains the deceleration phase from SM.V1 or SM.V2 to 0 in service motion mode 3.

Service Motion Mode 5



The deceleration process from SM.VPM1 or SM.VPM2 to 0 is is not included in SM.T1 and SM.T2, respectively. SM.T1 and SM.T2 start as soon as the command value has reached velocity 0.

SM.MOVE

General Information	
Type	Command
Description	Starts the service motion.
Units	N/A
Range	N/A
Default Value	N/A
Data Type	N/A
See Also	SM.MODE
Start Version	M_0-0-16

Description

This command starts the service motion that has been selected by the SM.MODE parameter.

SM.T1

General Information	
Type	R/W Parameter
Description	Sets service motion time 1.
Units	ms
Range	0 to 65,535 ms
Default Value	500 ms
Data Type	Integer
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T2, SM.V1, SM.V2, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

SM.T1 defines the time of the service motion that is used in all service motion modes (see SM.MODE). For an alternating service motion mode, SM.T1 may not be set to 0.

SM.T2

General Information	
Type	R/W Parameter
Description	Sets service motion time 2
Units	ms
Range	1 to 65,535 ms
Default Value	500 ms
Data Type	Integer
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.V1, SM.V2, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

SM.T2 defines the time of the service motion that is used in service motion modes 1, 3, and 5 (see SM.MODE).

SM.V1

General Information	
Type	R/W Parameter
Description	Sets service motion velocity 1.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: Counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: -12,000.000 to 12,000.000 rpm -200.000 to 200.000 rps -72,000.000 to 72,000.000 deg/s -1,000.000 to 1,000.000 (PIN/POUT)/s -1,256.637 to 1,256.637 rad/s Linear: -0.200 to 0.200 Counts/s -200.000*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s -200,000.000*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/s -1,000.000 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: 60.000 rpm 1.000 rps 359.999 deg/s 5.000 (PIN/POUT)/s 6.283 rad/s Linear: 0.001 Counts/s 1.000*MOTOR.PITCH mm/s 999.998*MOTOR.PITCH µm/sec 5.000 (PIN/POUT)/s
Data Type	Float
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V2, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

SM.V1 defines the velocity that is used in service motion modes 2 and 3 (see SM.MODE) in the closed velocity mode of operation.

SM.V2

General Information	
Type	R/W Parameter
Description	Sets service motion velocity 2.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: -12,000.000 to 12,000.000 rpm -200.000 to 200.000 rps -72,000.000 to 72,000.000 deg/s -1,000.000 to 1,000.000 (PIN/POUT)/s -1,256.637 to 1,256.637 rad/s Linear: -0.200 to 0.200 counts/s -200.000*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s -200,000.000*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/s -1,000.000 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: -60.000 rpm -1.000 rps -359.999 deg/s -5.000 (PIN/POUT)/s -6.283 rad/s Linear: -0.001 counts/s -1.000*MOTOR.PITCH mm/s -999.998*MOTOR.PITCH µm/sec -5.000 (PIN/POUT)/s
Data Type	Float
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V1, SM.VPM1, SM.VPM2
Start Version	M_0-0-16

Description

SM.V2 defines the velocity that is used in service motion mode 3 (see SM.MODE) in the closed velocity mode of operation.

SM.VPM1

General Information	
Type	R/W Parameter
Description	Sets service motion velocity 2 in position mode of operation.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: -12,000.000 to 12,000.000 rpm -200.000 to 200.000 rps -72,000.000 to 72,000.000 deg/s -1,000.000 to 1,000.000 (PIN/POUT)/s -1,256.637 to 1,256.637 rad/s Linear: -0.200 to 0.200 counts/s -200.000*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s -200,000.000*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/s -1000.000 to 1000.000 (PIN/POUT)/s
Default Value	Rotary: 60.000 rpm 1.000 rps 359.999 deg/s 5.000 (PIN/POUT)/s 6.283 rad/s Linear: 0.001 Counts/s 1.000*MOTOR.PITCH mm/s 999.998*MOTOR.PITCH µm/s 5.000 (PIN/POUT)/s
Data Type	Float
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V1, SM.V2, SM.VPM2
Start Version	M_0-0-16

Description

SM.VPM1 defines the velocity that is used in service motion mode 4 and 5 (see SM.MODE) in the closed position mode of operation.

SM.VPM2

General Information	
Type	R/W Parameter
Description	Sets service motion velocity 2 in position mode of operation.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: -12,000.000 to 12,000.000 rpm -200.000 to 200.000 rps -72,000.000 to 72,000.000 deg/s -1,000.000 to 1,000.000 (PIN/POUT)/s -1,256.637 to 1,256.637 rad/s Linear: -0.200 to 0.200 counts/s -200.000*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s -200,000.000*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/s -1,000.000 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: -60.000 rpm -1.000 rps -359.999 deg/s -5.000 (PIN/POUT)/s -6.283 rad/s Linear: -0.001 counts/s -1.000*MOTOR.PITCH mm/s -999.998*MOTOR.PITCH µm/s -5.000 (PIN/POUT)/s
Data Type	Float
See Also	SM.ACCTYPE, SM.I1, SM.I2, SM.MODE, SM.MOVE, SM.T1, SM.T2, SM.V1, SM.V2, SM.VPM1
Start Version	M_0-0-16

Description

SM.VPM2 defines the velocity that is used in service motion mode 5 (see SM.MODE) in the closed position mode of operation.

2 STO Parameters

STO.STATE

General Information	
Type	R/O Parameter
Description	Returns the status of the safe torque off.
Units	N/A
Range	0 to 1
Default Value	none
Data Type	Integer
See Also	N/A
Start Version	M_00-00-56-000

Description

STO.STATE returns the status of the safe torque off.

1 - Safe torque on (no safe torque off fault).

0 - Safe torque off (safe torque off fault).

SWLS Parameters

SWLS.EN

General Information	
Type	NV Parameter
Description	Position software emergency stop switch enable
Units	N/A
Range	0 to 3
Default Value	0
Data Type	U8
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter enables the software emergency stop switches. The software limit switches are only active if the axis is homed. For more information about homing, please refer to the HOME and DRV.MOTIONSTAT parameters.

Example

Bit 0 = 0: Disable SWLS.LIMIT0

Bit 0 = 1: Enable SWLS.LIMIT0

Bit 1 = 0: Disable SWLS.LIMIT1

Bit 1 = 1: Enable SWLS.LIMIT1

SWLS.LIMIT0

General Information	
Type	NV Parameter
Description	Sets the position software emergency stop switch 0
Units	Position units
Range	-9,007,199,254,740,992 to 9,007,199,254,740,991
Default Value	0
Data Type	S64
See Also	UNIT.PROTARY, UNIT.PLINEAR
Start Version	M_0-0-50-0

Description

This parameter sets the compare register for the software emergency stop switch 0. This can be either the lower or the upper software limit switch register, depending on SWLS.LIMIT1. The software limit switches are only active if the axis is homed. For more information about homing, please refer to the HOME and DRV.M-OTIONSTAT parameters.

SWLS.LIMIT1

General Information	
Type	NV Parameter
Description	Position software emergency stop switch 1
Units	Position units
Range	-9,007,199,254,740,992 to 9,007,199,254,740,991
Default Value	68,719,476,736
Data Type	S64
See Also	UNIT.PROTARY, UNIT.PLINEAR
Start Version	M_0-0-50-0

Description

This parameter sets the compare register for the software emergency stop switch 1. This value can be either the lower or the upper software limit switch register, depending on SWLS.LIMIT0. The software limit switches are only active if the axis is homed. For more information about homing, please refer to the HOME and DRV.M-OTIONSTAT parameters.

SWLS.STATE

General Information	
Type	R/O Parameter
Description	Actual status of SW limit switches.
Units	N/A
Range	0 to 3
Default Value	0
Data Type	U8
See Also	N/A
Start Version	M_0-0-50-0

Description

This parameter reads the status word of the software emergency stop switches. The status word indicates the result of the compare between the software emergency stop switch compare register and the actual position of the position loop.

Example

Bit 0 = 0: SWLS.LIMIT0 is not active.

Bit 0 = 1: SWLS.LIMIT0 is active.

Bit 1 = 0: SWLS.LIMIT1 is not active.

Bit 1 = 1: SWLS.LIMIT1 is active.

Bits 2 to 7 are currently not in use.

UNIT Parameters

UNIT.ACCLINEAR

General Information	
Type	NV Parameter
Description	Sets the linear acceleration/deceleration units.
Units	N/A
Range	0 to 3
Default Value	0
Data Type	Integer
See Also	DRV.ACC, DRV.DEC, MOTOR.TYPE
Start Version	M_0-0-15

Description

UNIT.ACCLINEAR sets the units type for the acceleration and deceleration parameters, when the motor type (MOTOR.TYPE) is linear.

UNIT.ACCLINEAR Types

Type	Description
0	[PIN/POUT]/s^2
1	millimeters per second squared (mm/s^2)
2	micrometers per second squared ($\mu m/s^2$)
3	Feedback counts/s^2

UNIT.ACCROTARY

General Information	
Type	NV Parameter
Description	Sets the rotary acceleration/deceleration units.
Units	rpm/s, rps/s, deg/s^2 , [PIN/POUT]/s^2
Range	0 to 3
Default Value	0 rpm/s
Data Type	Integer
See Also	DRV.ACC, "DRV.DEC" (page 88), MOTOR.TYPE
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3659h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

UNIT.ACCROTARY sets the acceleration/deceleration units when the motor type (MOTOR.TYPE) is rotary.

UNIT.ACCROTARY Types

Type	Description
0	rpm/s
1	rps/s
2	deg/s^2
3	(PIN/POUT)/s^2

UNIT.LABEL

General Information	
Type	NV Parameter
Description	Sets user-defined name for user-defined position units.
Units	N/A
Range	Maximum 16 characters, no spaces
Default Value	PIN/POUT
Data Type	String
See Also	UNIT.PLINEAR, UNIT.POUT
Start Version	M_0-0-50-0

Description

If you define a special position unit with UNIT.PLINEAR and UNIT.POUT, then you can give this unit a descriptive name. You can name the unit anything you wish, as long as the name is limited to 16 characters and includes no spaces. This name is shown in derived units as velocity and acceleration.

This parameter is descriptive only and does not influence drive internal functions in any way.

UNIT.PIN

General Information	
Type	NV Parameter
Description	Sets gear IN for the unit conversion.
Units	User units
Range	0 to 65,535
Default Value	100
Data Type	Integer
See Also	UNIT.POUT
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35CAh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

UNIT.PIN is used in conjunction with UNIT.POUT to set application specific units. This parameter is used as follows in the drive unit conversion:

- For position, this parameter sets the units as [PIN/POUT]/rev.
- For velocity, this parameter sets the units as [PIN/POUT]/s.
- For acceleration/deceleration, this parameter sets the units as [PIN/POUT]/s^2.

UNIT.PLINEAR

General Information	
Type	NV Parameter
Description	Sets the linear position units.
Units	N/A
Range	0 to 4
Default Value	0
Data Type	Integer
See Also	PL.FB, PL.CMD, MOTOR.TYPE
Start Version	M_0-0-15

Description

UNIT.PLINEAR sets the units type for the position parameters when the motor type (MOTOR.TYPE) is linear.

UNIT.PLINEAR Types

Type	Description
0	Counts (32 bit)
1	Millimeters (mm)
2	Micrometers (µm)
3	(PLINEAR/POUT) per revolution
4	Counts (16 Bit)

UNIT.POUT

General Information	
Type	NV Parameter
Description	Sets gear out for the unit conversion.
Units	User units.
Range	0 to 65,535
Default Value	100
Data Type	Integer
See Also	UNIT.PLINEAR
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	35CBh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

UNIT.POUT is used in conjunction with UNIT.PLINEAR to set application specific units in UNIT.POUT. This parameter is used as follows in the drive unit conversion:

- For position, this parameter sets the units as [PIN/POUT]/rev.
- For velocity, this parameter sets the units as [PIN/POUT]/s.
- For acceleration/deceleration, this parameter sets the units as [PIN/POUT]/s^2.

UNIT.PROTARY

General Information	
Type	NV Parameter
Description	Sets the position units when the motor type (MOTOR.TYPE) is rotary.
Units	feedback counts, rad, deg, [PIN/POUT]
Range	0 to 3
Default Value	0 feedback counts
Data Type	Integer
See Also	PL.FB, PL.CMD, MOTOR.TYPE
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3660h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

UNIT.PROTARY sets the position units when the motor type (MOTOR.TYPE) is rotary.

UNIT.PROTARY Types

Type	Description
0	counts
1	radians
2	degrees
3	[PIN/POUT]

UNIT.VLINEAR

General Information	
Type	NV Parameter
Description	Sets the linear velocity units.
Units	N/A
Range	0 to 3
Default Value	0
Data Type	Integer
See Also	VL.FB, VL.CMDU, VL.CMD, MOTOR.TYPE
Start Version	M_0-0-15

Description

UNIT.VLINEAR sets the units type for the velocity parameters when the motor type (MOTOR.TYPE) is linear.

UNIT.VLINEAR Types

Type	Description
0	(PIN/POUT) per second
1	Micrometers per second
2	Millimeters per second
3	Counts per second

UNIT.VROTARY

General Information	
Type	NV Parameter
Description	Sets the velocity units when the motor type (MOTOR.TYPE) is rotary.
Units	rpm, rps, deg/s, (PIN/POUT)/s
Range	0 to 3
Default Value	0 rpm
Data Type	Integer
See Also	VL.FB, VL.CMDU, VL.CMD, MOTOR.TYPE
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	365Fh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

UNIT.VROTARY sets the velocity units when the motor type (MOTOR.TYPE) is rotary.

UNIT.VROTARY Types

Type	Description
0	rpm
1	rps
2	deg/s
3	(PIN/POUT)/s

VBUS Parameters

VBUS.OVFTHRESH

General Information	
Type	R/O Parameter
Description	Reads the over voltage fault level.
Units	V
Range	0 to 900 V
Default Value	N/A
Data Type	Integer
See Also	VBUS.UVFTHRESH
Start Version	M_0-0-15

Description

VBUS.OVFTHRESH reads the over voltage fault level for the DC bus.

This value is read from the drive EEPROM and varies according to the drive type.

VBUS.OVFWTHRESH

General Information	
Type	NV Parameter
Description	Sets voltage level for over voltage warning.
Units	V
Range	0 to 900 V
Default Value	0 (warning disabled)
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

If VBUS.VALUE value exeeds VBUS.OVFWTHRESH, then a warning is generated.

VBUS.RMSLIMIT

General Information	
Type	R/O Parameter
Description	Reads the limit for the bus capacitors load.
Units	Vrms
Range	N/A
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_00-00-55-000

Description

This parameter reads the limit of the bus capacitor load. When the bus capacitor loads exceeds this limit, the drive generates fault F503.

Excessive bus capacitor load may indicate a disconnected main supply phase.

VBUS.UVFTHRESH

General Information	
Type	R/O Parameter
Description	Reads the under voltage fault level.
Units	V
Range	0 to 900 V
Default Value	N/A
Data Type	Integer
See Also	VBUS.OVFTHRESH
Start Version	M_0-0-15

Description

VBUS.UVFTHRESH reads the undervoltage fault level of the DC bus.

The value is read from the drive EEPROM. The value is varied according to drive type.

VBUS.UVMODE

General Information	
Type	
Description	Indicates undervoltage (UV) mode.
Units	N/A
Range	0 to 1
Default Value	1
Data Type	Boolean
See Also	N/A
Start Version	M_0-0-37

Description

This parameter indicates undervoltage (UV) mode.

When VBUS.UVMODE - 0, an undervoltage fault is issued whenever the DC bus goes below the undervoltage threshold.

When VBUS.UVMODE = 1, an undervoltage fault is issued whenever the DC bus goes below the under voltage threshold and the controller attempts to enable the drive (software or hardware enable).

VBUS.UVWTHRESH

General Information	
Type	NV Parameter
Description	Sets voltage level for undervoltage warning.
Units	V
Range	0 to 900 V
Default Value	0 V (warning disabled)
Data Type	U16
See Also	N/A
Start Version	M_0-0-50-0

Description

If VBUS.VALUE value drops below VBUS.UVWTHRESH, then a warning is generated.

Measured Bus Voltage: VBUS.VALUE

General Information	
Type	R/O Parameter
Description	Reads DC bus voltage.
Units	V
Range	0 to 900 V
Default Value	N/A
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	361Ah/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

VBUS.VALUE reads the DC bus voltage.

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VL Parameters

VL.ARPF1 TO VL.ARPF4

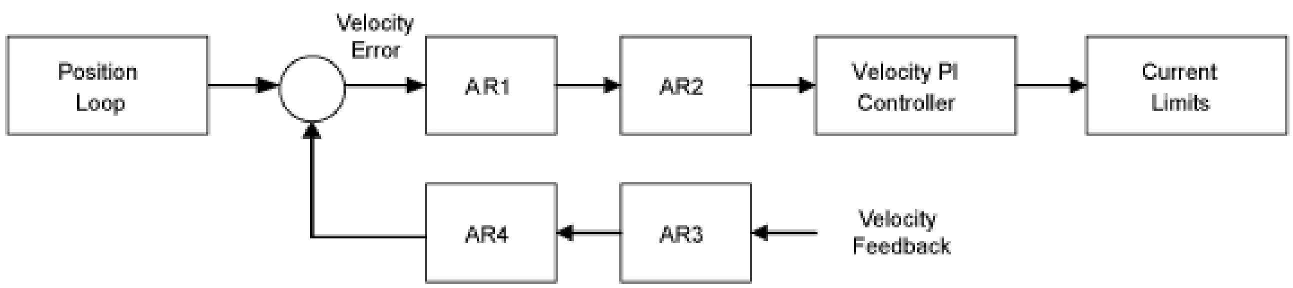
General Information	
Type	R/W Parameter
Description	Sets the natural frequency of the pole (denominator) of anti-resonance (AR) filters 1, 2, 3, and 4.
Units	Hz
Range	5 to 5,000 Hz
Default Value	500 Hz
Data Type	Float
See Also	VL.ARPQ1 TO VL.ARPQ4, VL.ARZF1 TO VL.ARZF4, Sets the Q of the zero (numerator) of anti-resonance filter #1.
Start Version	

Description

VL.ARPF1 sets the natural frequency of the pole (denominator) of AR filter 1. This value is F_P in the approximate transfer function of the filter:

$ARx(\mathbf{s}) = [\mathbf{s}^2/(2\pi F_Z)^2 + \mathbf{s}/(Q_Z 2\pi F_Z) + 1] / [\mathbf{s}^2/(2\pi F_P)^2 + \mathbf{s}/(Q_P 2\pi F_P) + 1]$

The following block diagram describes the AR filter function; note that AR1 and AR2 are in the forward path, while AR3 and AR4 are applied to feedback:



AR1, AR2, AR3, and AR4 are used in velocity and position mode, but are disabled in torque mode.

Discrete time transfer function (applies to all AR filters)

The velocity loop compensation is actually implemented as a digital discrete time system function on the DSP. The continuous time transfer function is converted to the discrete time domain by a backward Euler mapping:

$\mathbf{s} \approx (1-z^{-1})/t$, where $t = 62.5\ \mu s$

The poles are prewarped to F_P and the zeros are prewarped to F_Z.

VL.ARPQ1 TO VL.ARPQ4

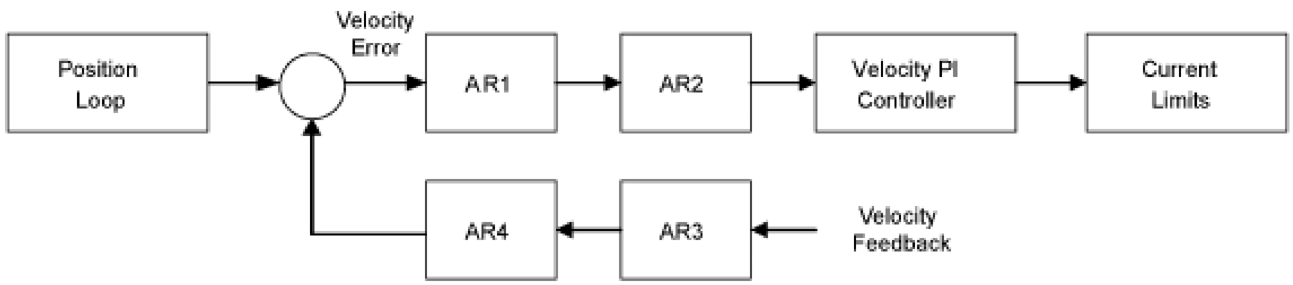
General Information	
Type	R/W Parameter
Description	Sets the Q of the pole (denominator) of anti-resonance (AR) filter 1.
Units	None
Range	0.2 to 20
Default Value	0.5
Data Type	Float
See Also	VL.ARPF1 TO VL.ARPF4, VL.ARZF1 TO VL.ARZF4, VL.ARZQ1 TO VL.ARZQ4
Start Version	

Description

VL.ARPQ1 sets the Q (quality factor) of the pole (denominator) of AR filter 1. This value is Q_P in the approximate transfer function of the filter:

$$ARx(\mathbf{s}) = [\mathbf{s}^2/(2\pi F_Z)^2+\mathbf{s}/(Q_Z 2\pi F_Z) + 1]/ [\mathbf{s}^2/(2\pi F_P)^2 +\mathbf{s}/(Q_P 2\pi F_P) + 1]$$

The following block diagram describes the AR filter function; note that AR1 and AR2 are in the forward path, while AR3 and AR4 are applied to feedback:



AR1, AR2, AR3, and AR4 are used in velocity and position mode, but are disabled in torque mode.

Discrete time transfer function (applies to all AR filters)

The velocity loop compensation is actually implemented as a digital discrete time system function on the DSP. The continuous time transfer function is converted to the discrete time domain by a backward Euler mapping:

$\mathbf{s} \approx (1-z^{-1})/t$, where t = 62.5 µs

The poles are prewarped to F_P and the zeros are prewarped to F_Z.

VL.ARTYPE1 TO VL.ARTYPE4

General Information	
Type	NV Parameter
Description	Indicates the method used to calculate BiQuad coefficients.
Units	N/A
Range	0
Default Value	0
Data Type	U8
See Also	N/A
Start Version	M_00-00-56-000

Description

These parameters indicate the method used to calculate the biquad coefficients VL.ARPFx, VL.ARPQx, VL.ARZFx, and VL.ARZQx. A value of 0 indicates that the coefficients are set directly. This parameter has no effect on the filter itself, but is only used to determine the original design parameters. Currently, only the value of 0 is supported.

VL.ARZF1 TO VL.ARZF4

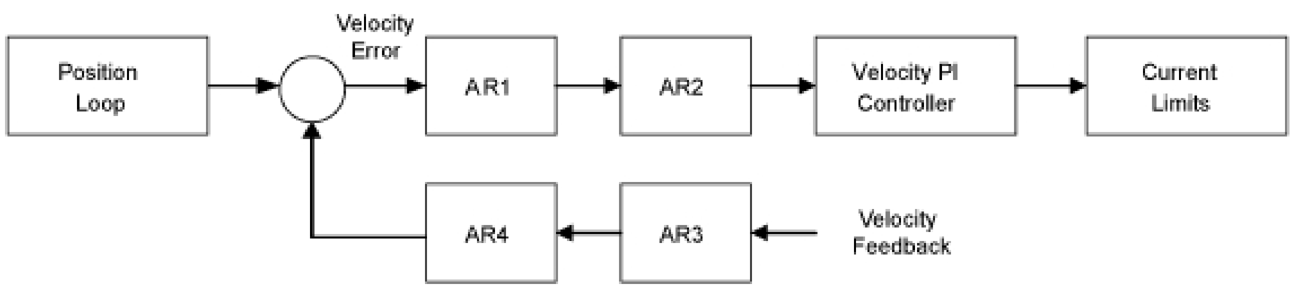
General Information	
Type	R/W Parameter
Description	Sets the natural frequency of the zero (numerator) of anti-resonance (AR)filter 1.
Units	Hz
Range	5 to 5,000 Hz
Default Value	500 Hz
Data Type	Float
See Also	VL.ARPF1 TO VL.ARPF4,VL.ARPQ1 TO VL.ARPQ4, VL.ARZQ1 TO VL.ARZQ4
Start Version	

Description

VL.ARZF1 sets the natural frequency of the zero (numerator) of AR filter 1. This value is F_Z in the approximate transfer function of the filter:

$$ARx(\mathbf{s}) = [\mathbf{s}^2/(2\pi F_Z)^2 + \mathbf{s}/(Q_Z 2\pi F_Z) + 1]/ [\mathbf{s}^2/(2\pi F_P)^2 + \mathbf{s}/(Q_P 2\pi F_P) + 1]$$

The following block diagram describes the AR filter function; note that AR1 and AR2 are in the forward path, while AR3 and AR4 are applied to feedback:



AR1, AR2, AR3, and AR4 are used in velocity and position mode, but are disabled in torque mode.

Discrete time transfer function (applies to all AR filters)

The velocity loop compensation is actually implemented as a digital discrete time system function on the DSP. The continuous time transfer function is converted to the discrete time domain by a backward Euler mapping:

$\mathbf{s} \approx (1-z^{-1})/t$, where t = 62.5 µs

The poles are prewarped to F_P and the zeros are prewarped to F_Z.

VL.ARZQ1 TO VL.ARZQ4

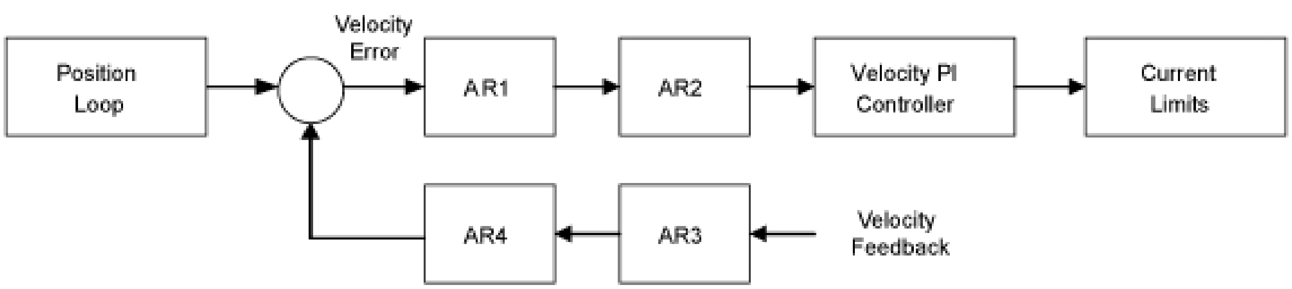
General Information	
Type	R/W Parameter
Description	Sets the Q of the zero (numerator) of anti-resonance filter #1.
Units	N/A
Range	0.1 to 5
Default Value	0.5
Data Type	Float
See Also	VL.ARPF1 TO VL.ARPF4, VL.ARPQ1 TO VL.ARPQ4, VL.ARZF1 TO VL.ARZF4
Start Version	

Description

VL.ARZQ1 sets the Q (quality factor) of the zero (numerator) of AR filter 1. This value is Q_Z in the approximate transfer function of the filter:

AR1(**s**) = $[\mathbf{s}^2/(2\pi F_Z)^2+\mathbf{s}/(Q_Z 2\pi F_Z) + 1]/ [\mathbf{s}^2/(2\pi F_P)^2 +\mathbf{s}/(Q_P 2\pi F_P) + 1]$

The following block diagram describes the AR filter function; note that AR1 and AR2 are in the forward path, while AR3 and AR4 are applied to feedback:



AR1, AR2, AR3 and AR4 are used in velocity and position mode, but are disabled in torque mode.

Discrete time transfer function (applies to all AR filters)

The velocity loop compensation is actually implemented as a digital discrete time system function on the DSP. The continuous time transfer function is converted to the discrete time domain by a backward Euler mapping:

s ≈ $(1-z^{-1})/t$, where t = 62.5 µs.

The poles are prewarped to F_P and the zeros are prewarped to F_Z.

VL.BUSFF

General Information	
Type	R/O Parameter
Description	Displays the velocity loop feedforward value injected by the field-bus
Units	Depends on UNIT.VROTARY or UNIT.VLINEARUNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	0.0 to VL.LIMITP
Default Value	0.0
Data Type	Float
See Also	VL.FF, VL.KBUSFF
Start Version	M_0-0-32

Description

Displays the velocity loop feedforward value injected by the fieldbus.

VL.CMD

General Information	
Type	R/O Parameter
Description	Reads the actual velocity command.
Units	Depends on UNIT.VROTARY or UNIT.VLINEARUNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	N/A
Default Value	N/A
Data Type	Float
See Also	VL.FB, VL.CMDU, VL.LIMITP, VL.LIMITN
Start Version	M_0-0-15

Description

VL.CMD returns the actual velocity command as it is received in the velocity loop entry after all velocity limits (such as VL.LIMITN and VL.LIMITP). See velocity loop design diagram for more details.

VL.CMDU

General Information	
Type	R/W Parameter
Description	Sets the user velocity command.
Units	Depends on UNIT.VROTARY or UNIT.VLINEARUNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: -12,000.000 to 12,000.000 rpm -200.000 to 200.000 rps -72,000.000 to 72,000.00 deg/s -1,000.000 to 1,000.000 (PIN/POUT)/s -1,256.637 to 1,256.637 rad/s Linear: -0.200 to 0.200 counts/s -200.000*MOTOR.PITCH to 200.000*MOTOR.PITCH mm/s -200,000.000*MOTOR.PITCH to 200,000.000*MOTOR.PITCH µm/s -1000.000 to 1000.000 (PIN/POUT)/s
Default Value	0
Data Type	Float
See Also	VL.FB, VL.CMD, DRV.OPMODE, DRV.CMDSOURCE
Start Version	M_0-0-15

Description

VL.CMDU sets the user velocity command.

When DRV.OPMODE is set to 1 (velocity loop) and DRV.CMDSOURCE is set to 0 (TCP/IP channel), then setting this value when the drive is enabled will cause the drive to rotate at the required velocity.

VL.ERR

General Information	
Type	R/O Parameter
Description	Sets the velocity error.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	N/A
Default Value	N/A
Data Type	Float
See Also	VL.CMD, VL.FB
Start Version	M_0-0-15

Description

VL.ERR sets the velocity error. It is calculated in the velocity loop as the difference between VL.CMD and VL.FB. See the velocity loop design for more information.

VL.FB

General Information	
Type	R/O Parameter
Description	Reads the velocity feedback.
Units	Depends on UNIT.VROTARY or UNIT.VLINEARUNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: Counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	N/A
Default Value	N/A
Data Type	Float
See Also	VL.CMDU
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3618h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

VL.FB returns the velocity feedback as it is received in the velocity loop.

VL.FBFILTER

General Information	
Type	R/O Parameter
Description	Filters VL.FB value.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	N/A
Default Value	N/A
Data Type	Float
See Also	VL.FB
Start Version	M-0-0-50-0

Description

This parameter returns the same value as VL.FB, filtered through a 10 Hz filter.

VL.FBSOURCE

General Information	
Type	NV Parameter
Description	Sets feedback source for the velocity loop.
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Boolean
See Also	PL.FBSOURCE
Start Version	M_00-00-51-000

Description

This parameter determines the feedback source to be used by the velocity loop. A value of 0 selects the primary feedback, 1 selects the secondary feedback.

VL.FF

General Information	
Type	R/O Parameter
Description	Displays the velocity loop overall feedforward value.
Units	Depends on UNIT.ACCROTARY or UNIT.ACCLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	0 to VL.LIMITP
Default Value	0
Data Type	Float
See Also	VL.KBUSFF, VL.KVFF, VL.ACCFFGAIN
Start Version	M_0-0-32

Description

This parameter displays the velocity loop overall feedforward value.

VL.GENMODE

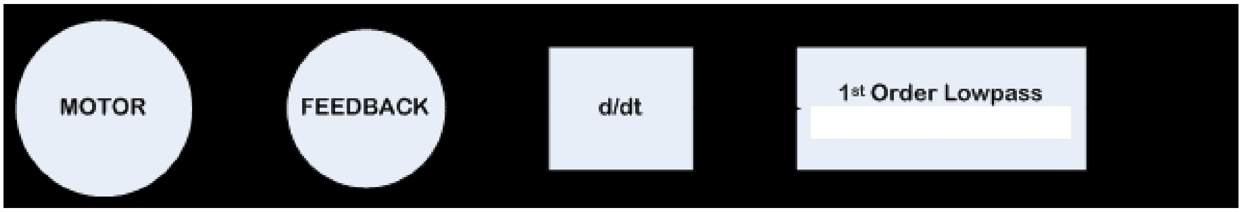
General Information	
Type	NV Parameter
Description	Selects mode of velocity generation (Observer, d/dt).
Units	N/A
Range	0 to 1
Default Value	0
Data Type	Integer
See Also	N/A
Start Version	M_0-0-15

Description

This parameter is used to select the velocity generator mode.

Mode	Description
0	d/dt mode, the derivative of the mechanical angle of the drive, is fed to a first order low pass.
1	Luenberger Observer mode, (TBD the Luenberger observer is not implemented yet)

d/dt Mode



VL.KBUSFF

General Information	
Type	R/W Parameter
Description	Sets the velocity loop acceleration feedforward gain value.
Units	NA
Range	0.0 to 2.0
Default Value	0.0
Data Type	Float
See Also	VL.BUSFF
Start Version	M_0-0-32

Description

This parameter sets the gain for the acceleration feedforward (a scaled second derivative of the position command is added to the velocity command value).

The nominal feedforward value can be multiplied by this gain value.

This will have affect only when using position mode (DRV.OPMODE = 2).

VL.KI

General Information	
Type	NV Parameter
Description	Sets the velocity loop integral gain for the PI controller.
Units	Hz
Range	0.000 to 2,147,483.008 Hz
Default Value	160.000 Hz
Data Type	Float
See Also	VL.KP
Start Version	M_0-0-15

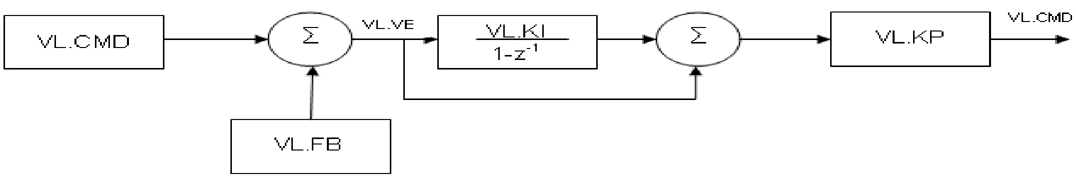
Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	354Dh/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

VL.KI sets the integral gain of the velocity loop.

A factor of 2π is included in the time calculation, therefore a PI velocity loop with a constant error of 1 rps in which VL.KI is set to 160 and VL.KP is set to 1, will take (1000/160)*2π ms to increase the integral gain to 1. Therefore, the total gain is 2 at this time (see velocity loop structure below).

Velocity Loop Structure



VL.KP

General Information	
Type	NV Parameter
Description	Sets velocity loop proportional gain for the PI controller.
Units	A/(rad/sec)
Range	0.001 to 2,147,483.008
Default Value	1
Data Type	Float
See Also	VL.KI
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3548h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

VL.KP sets the proportional gain of the velocity loop.

The idealized velocity loop bandwidth in Hz is:

VL.KP *Kt/ (2π *Jm)

Where:

Kt is the motor torque constant and Jm is the total shaft inertia. The units of Kt/Jm are rad/sec^2/A.

See Velocity Controller Environment Block Diagram for more information.

VL.KVFF

General Information	
Type	R/W Parameter
Description	Velocity loop velocity feedforward gain value
Units	NA
Range	0.0 to 2.0
Default Value	0.0
Data Type	Float
See Also	VL.FF
Start Version	M_0-0-32

Description

This parameter sets the gain for the velocity feedforward (a scaled derivative of the position command is added to the velocity command value). The nominal feedforward value can be multiplied by this gain value.

This parameter is only used in the position mode (DRV.OPMODE = 2).

VL.LIMITN

General Information	
Type	NV Parameter
Description	Sets the velocity lower limit.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: -12,000.000 to 0.000 rpm -200.000 to 0.000 rps -72,000.000 to 0.000 deg/s -1,000.000 to 0.000 (PIN/POUT)/s -12,56.637 to 0.000 rad/s Linear: -0.200 to 0.000 counts/s -200.000*MOTOR.PITCH to 0.000 mm/s -200,000.000*MOTOR.PITCH to 0.000 µm/sec -1,000.000 to 0.000 (PIN/POUT)/s
Default Value	Rotary: -3,000.000 rpm -50.000 rps -17,998.998 deg/s -250.000 (PIN/POUT)/s -314.159 rad/s Linear: -0.050 Counts/s -50*MOTOR.PITCH mm/s -49,999.996*MOTOR.PITCH µm/sec -250.000 (PIN/POUT)/s
Data Type	Float
See Also	VL.LIMITP, VL.CMD
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3623h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

VL.LIMITN sets the velocity command negative limit.

If the input to the velocity loop is lower than VL.LIMITN, then the actual velocity command VL.CMD is limited by the value of VL.LIMITN.

VL.LIMITP

General Information	
Type	NV Parameter
Description	Sets the velocity high limit.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: 0.000 to 12,000.000 rpm 0.000 to 200.000 rps 0.000 to 72,000.000 deg/s 0.000 to 1,000.000 (PIN/POUT)/s 0.000 to 1256.637 rad/s Linear: 0.000 to 0.200 Counts/s 0.000 to 200.000*MOTOR.PITCH mm/sec 0.000 to 200,000.000*MOTOR.PITCH µm/s 0.000 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: 3,000.000 rpm 50.000 rps 17,998.998 deg/s 250.000 (PIN/POUT)/s 314.159 rad/s Linear: 0.050 Counts/s 50.000*MOTOR.PITCH mm/sec 49,999.996*MOTOR.PITCH µm/sec 250.000 (PIN/POUT)/s
Data Type	Float
See Also	VL.LIMITN, VL.CMD
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	**3622h/0**
Data Type	**Integer 32**
PDO Mappable	**No**
Start Version	**M_00-00-62-000**

Description

VL.LIMITP sets the velocity command positive limit.

If the input to the velocity loop is higher than VL.LIMITP, then the actual velocity command VL.CMD is limited by the value of VL.LIMITP.

VL.LMJR

General Information	
Type	R/W Parameter
Description	Sets the ratio of the estimated load moment of inertia relative to the motor moment of inertia.
Units	NA
Range	0 to 100.0
Default Value	0
Data Type	Float
See Also	IL.KACCFF, IL.FF
Start Version	M_0-0-32

Description

This parameter is used in the internal calculation of the current loop acceleration feed forward gain value.

VL.THRESH

General Information	
Type	NV Parameter
Description	Sets the over speed fault value.
Units	Depends on UNIT.VROTARY or UNIT.VLINEAR Rotary: rpm, rps, deg/s, (PIN/POUT)/s, rad/s Linear: counts/s, mm/s, µm/s, (PIN/POUT)/s
Range	Rotary: 0 to 1,200.000 rpm 0 to 200.000 rps 0 to 72,000.000 deg/s 0 to 1,000.000 (PIN/POUT)/s 0.000 to 1,256.637 rad/s Linear: 0.000 to 0.200 counts/s 0.000 to 200.000*MOTOR.PITCH mm/sec 0.000 to 200,000.000*MOTOR.PITCH µm/s 0 to 1,000.000 (PIN/POUT)/s
Default Value	Rotary: 1,000.000 rpm 16.667 rps 21,600.000 deg/s 300.000 (PIN/POUT)/s 376.991 rad/s Linear: 0.060 counts/s 60.000*MOTOR.PITCH mm/sec 60,000.000*MOTOR.PITCH µm/s 300.000 (PIN/POUT)/s
Data Type	Float
See Also	VL.CMD, VL.CMDU
Start Version	M_0-0-15

Fieldbus Information	
	EtherCAT COE & CANopen
Index/Subindex or Parameter Number	3627h/0
Data Type	Integer 32
PDO Mappable	No
Start Version	M_00-00-62-000

Description

VL.THRESH sets the threshold for the velocity over which an over speed fault is generated.

The value is considered as an absolute value, hence it applies for both negative and positive velocities.

Example

VL.THRESH is set to 600 rpm. A velocity command of 700 rpm will generate an over speed fault.

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