AKD1G EtherCAT/CANopen Profile Torque Scaling Rev A. 3/29/2021

While most EtherCAT implementations with the AKD1G utilize the default PDO mapping and interpolated position mode to the EtherCAT master it is possible to use other modes of operations within the DS402 standard. This application note will demonstrate both PDO setup and operation as well as the different scaling methods. Keep in mind many EtherCAT masters provide additional scaling on the master's side of configuration and programming which is beyond the scope of this application note. We will assume either Workbench or DS402 Scaling objects are used without any additional scaling.

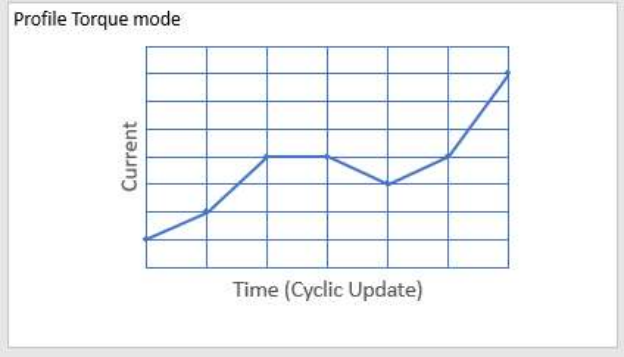
The following will be demonstrated:

Modes of Operation
Profile Torque Mode

Object 6060h Modes of Operation=4

Fieldbus
Profile Torque Mode is supported by the following fieldbuses:

- CANbus/CANopen
- EtherCAT/CANopen over EtherCAT (CoE)



Description

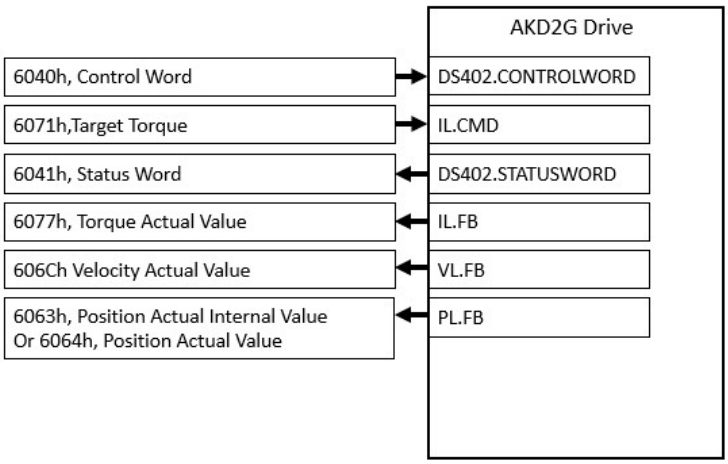
Profile Torque Mode is a CANopen (DS402) mode of operation used for real-time torque (current) control. The CANopen objects define the settings for this mode. With Profile Torque Mode the torque command is sent from the master to the current loop in the slave drive. The drive operates in torque mode. The drive commands the specified current to the motor.

Op Mode and Command Source

The AKD op mode and command source are automatically configured when the modes of operation is set through object 6060h (modes of operation)

6060h=4 (Profile Torque)
DRV.OPMODE=0 (Torque)
DRV.CMDSOURCE=1 (Fieldbus)

Common PDO Data



The manual shows the list of mandatory and optional objects related to Profile Torque mode (6060h modes of operation= 4).

Index	Object	Name	Type	Access
2071h	VAR	Target current	INTEGER32	R/W
2077h	VAR	Current actual value	INTEGER32	R/O
207fh	VAR	Maximum velocity	UNSIGNED32	R/W
6071h	VAR	Target torque	INTEGER16	R/W
6073h	VAR	Max current	UNSIGNED16	R/W
6077h	VAR	Torque actual value	INTEGER16	R/O
6087h	VAR	Torque slope	UNSIGNED32	R/W

The CANopen manual also lists the following which was not in the given chart above.
60E0h Positive Torque Limit Value
60E1h Negative Torque Limit Value

Objects 606C Velocity Actual Value and 6063h Position Actual Internal Value or 6064h Position Actual Value were also added as common objects to monitor.

6.7.2.3 Object 207Fh: Maximum Velocity

Maximum velocity This parameter limits the velocity of the motor in profile torque and cyclic synchronous torque mode. The scaling is the same as for object 60FFh.

Index	207Fh
Name	Maximum velocity
Object code	VAR
Data type	UNSIGNED32
Category	optional
Access	RW
PDO mapping	possible
Value range	
Default value	0, means no limitation

6.7.2.4 Object 6071h: Target torque (DS402)

This parameter is the input value for the torque controller in profile torque mode and the value is given per thousand (1‰) of rated torque.

Index	6071h
Name	Target torque
Object code	VAR
Data type	INTEGER16
Category	conditional; mandatory, if tq supported
Access	R/W
PDO mapping	possible
Value range	INTEGER16
Default value	0

6.7.2.5 Object 6073h: Max current (DS402)

This value represents the maximum permissible torque creating current in the motor and is given per thousand (1‰) of rated current.

Index	6073h
Name	Max current
Object code	VAR
Data type	UNSIGNED16
Category	optional
Access	R/W
PDO mapping	not possible
Value range	UNSIGNED16
Default value	0

6.7.2.6 Object 6077h: Torque actual value (DS402)

The torque actual value corresponds to the instantaneous torque in the drive motor. The value is given per thousand (1‰) of rated torque. This object reflects the actual current (DRV.ICONT).

Index	6077h
Name	Torque actual value
Object code	VAR
Data type	INTEGER16
Category	optional

Access	R/O
PDO mapping	possible
Value range	INTEGER16
Default value	0

6.7.2.7 Object 6087h Torque slope (DS402)

This object defines the rate of change of torque. The value is given in units of per thousand of rated torque per second. The minimum rate settable for the AKD is equivalent to the value of DRV.ICONT (= 1000 per mille) per ~ 420 milliseconds equivalent to a value of ~ 2385 per mille / second.

Index	6087h
Name	Torque slope
Object code	VAR
Data type	UNSIGNED32
Category	mandatory, if tq is supported

Access	R/W
PDO mapping	possible
Value range	UNSIGNED32
Default value	-

6.7.2.8 Object 60E0h: Positive Torque Limit Value

The object gives the configured maximum motor torque in positive direction. The value is given per thousand (1 ‰) of rated torque.

Index	60E0h
Name	Positive Torque Limit Value
Object code	Variable
Data type	UINTEGER16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UINTEGER16 (limited by DRV.IPEAK and MOTOR.IPEAK)
Default value	0

AKD CANopen | 6 CANopen Drive Profile

6.7.2.9 Object 60E1h: Negative Torque Limit Value

The object gives the configured maximum motor torque in negative direction. The value is given per thousand (1 ‰) of rated torque.

Index	60E1h
Name	Negative Torque Limit Value
Object code	Variable
Data type	UINTEGER16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UINTEGER16 (limited by DRV.IPEAK and MOTOR.IPEAK)
Default value	0

Scaling Definitions

For profile torque mode there are 2 types of parameters related to torque:

1) DS402 described as per thousand of rated torque
2) in milliamps

SDO scaling=PDO scaling

Type 1 DS402 (per thousand of rated torque)

Objects that apply:

- 6071h (target torque)
- 6073h (max current)
- 6077h (torque actual value)
- 60E0h (positive torque limit value)
- 60E1h (negative torque limit value)

$$Fieldbus\ Value = \frac{Target\ Amps}{Drive\ Continuous\ Rating} \times 1000$$

Example1:

Desired current limits +/- 1.5 amps with a 3 amp drive.

$$Object\ 6073h\ (Max\ Current) = \frac{Target\ Current\ Limit\ (amps)}{Drive\ Continuous\ Rating(amps)} \times 1000$$

$$Object\ 6073h\ (Max\ Current) = \frac{1.5\ amps}{3\ amps} \times 1000 = 500 \text{ (decimal) or 1F4h}$$

In this example when written IL.LIMITP=1.5 amps and IL.LIMITN=-1.5 amps when viewed in Workbench.

Example #2

6077h (torque actual value) over fieldbus= 50; 3A drive.

$$IL.FB\ (\ actual\ amps\ Workbench\ ) = \frac{Drive\ Continuous\ Rating}{1000} \times Fieldbus\ Value$$

$$IL.FB\ (\ actual\ amps\ Workbench\ ) = \frac{3\ amps}{1000} \times 50 = 0.150\ amps$$

Type 2 Manufacture Specific (mA):

Objects that apply:
2071h (Target Current)
2077h (Current Actual Value)

Example:Object 2071h (Target Current) for the second type (mA).

Fieldbus Value=HEX(desired current command in mA)

Example: desired current command=0.25A or 250mA where 250 (decimal)=FAh

Object2071h (target current)=FAh

Object 2077h(torque actual)=FAh as well in this case.

Note: One observance in TwinCAT in regards to setting 6071h and 2071 is if you set a value of 150 in 6071 and checked 2071 in CoE it would also display a value of 150 and the converse is true as well. This doesn't make a lot of sense due to each being scaled and in different units.

Finally 2071h or 6071h writes directly to the IL.CMD (current loop command) and doesn't utilize the IL.CMDU (current loop command user).

-->IL.CMD
0.150 [Arms]
-->IL.CMDU
0.000 [Arms]
-->

Object 6087h Torque Slope

Object 6087 Torque Slope provides a way for the user to ramp the torque command instead of a step function.

6.7.2.7 Object 6087h Torque slope (DS402)

This object defines the rate of change of torque. The value is given in units of per thousand of rated torque per second. The minimum rate settable for the AKD is equivalent to the value of DRV.ICONT (= 1000 per mille) per ~ 420 milliseconds equivalent to a value of ~ 2385 per mille / second.

Index	6087h
Name	Torque slope
Object code	VAR
Data type	UNSIGNED32
Category	mandatory, if tq is supported

Access	R/W
PDO mapping	possible
Value range	UNSIGNED32
Default value	-

6087h=Torque Slope =1000=3000mA (3 amp drive)

$$6087h = Torque\ Slope = 1000\ (fieldbus\ value) = 3000mA\ for\ 3A\ drive$$

$$Actual\ Slope = \frac{3000mA}{420msec} = 7.14285\ \frac{A\ rms}{s}$$

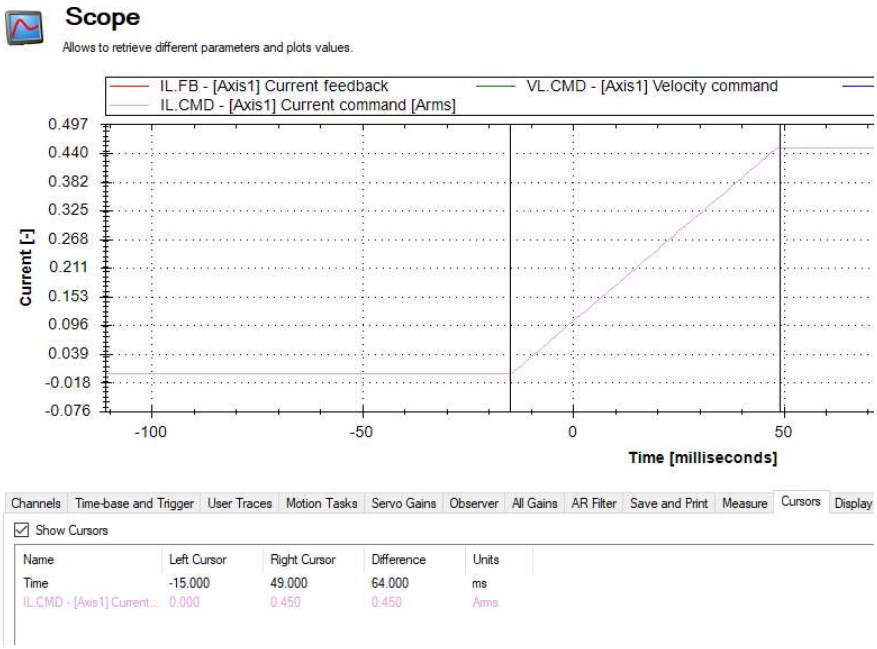
Note: using definition of 2.385 mA/420msec; 3000 is 3x 1000 so 3x 2.385= 7.14285

$$Ramp\ Time = command\ current\ \div Actual\ Slope$$

For a command of 0.450A (fieldbus value of object 6071h=150 or 2071h=450

$$Ramp\ Time = command\ current\ \div Actual\ Slope$$

$$Ramp\ Time = 0.450\ \div 7.14285\ \frac{Arms}{s} = 0.063\,\text{sec}\ or\ 63msec$$



6087h=Torque Slope =3000=9000mA (3 amp drive)

$$6087h = Torque\ Slope = 3000\ (fieldbus\ value) = 9000mA\ for\ 3A\ drive$$

$$Actual\ Slope = \frac{9000mA}{420msec} = 21.4285\ \frac{A\ rms}{s}$$

$$Ramp\ Time = command\ current \div Actual\ Slope$$

For a command of 0.450A (fieldbus value of object 6071h=150 or 2071h=450

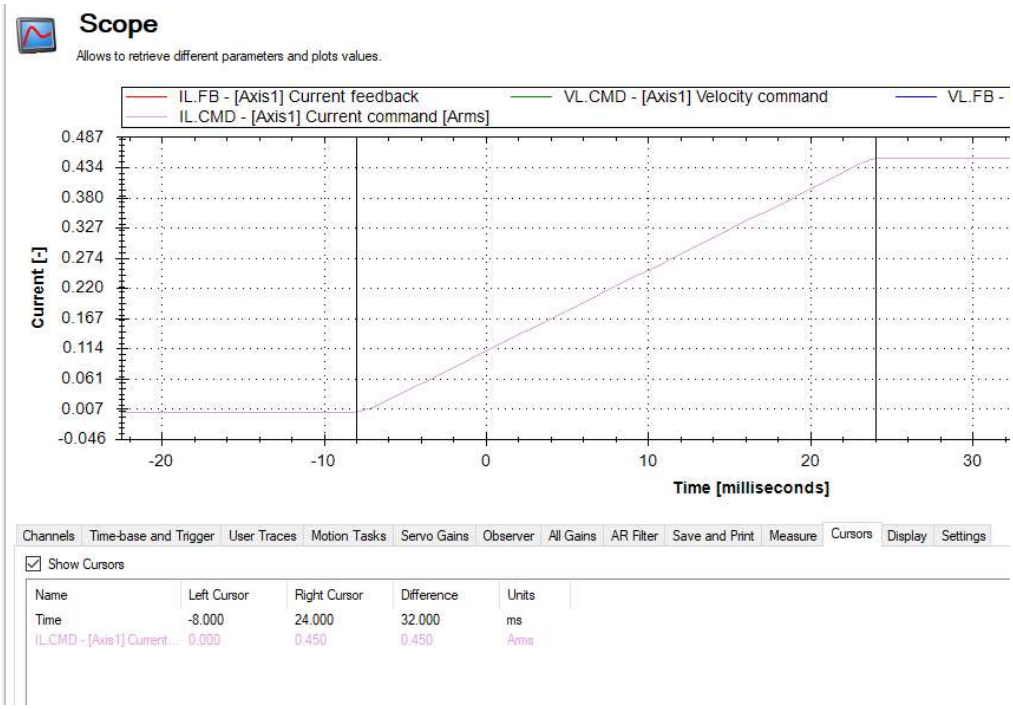
$$Ramp\ Time = command\ current\ \div Actual\ Slope$$

$$Ramp\ Time = 0.450\ \div 21.4285\ \frac{Arms}{s} = 0.021\,\text{sec}\ or\ 21\ msec$$

However the time was 32msec which is actually a slope of 0.45A/0.032s=14 A/s.

Note: using definition of 2.385 mA/420msec; 9000 is 9x 1000 so 9x 2.385= 21.465 so this slope doesn't make sense.

I would not have expected a tripling of the scaling to result in doubling of the slope. Weird.



Velocity Monitoring in Profile Torque Mode

6.6.2.1 Object 606Ch: Velocity actual value (DS402)

The object velocity actual value represents the actual speed.

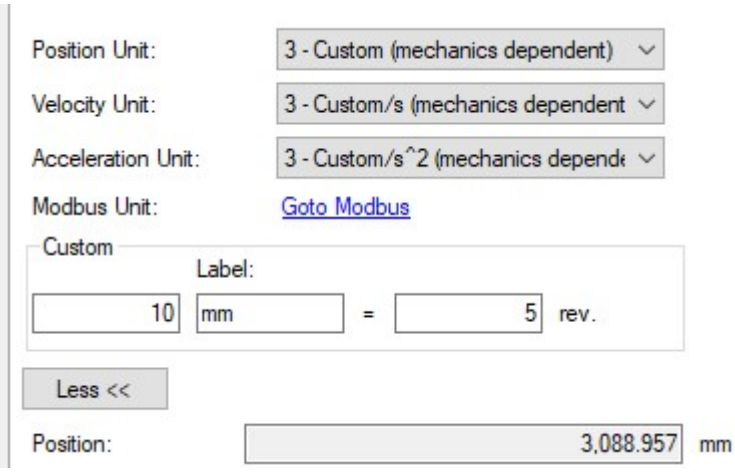
Index	606Ch
Name	velocity actual value, VL.FB
Object code	VAR
Data type	INTEGER32
Mode	pv
Access	R/O
PDO mapping	possible
Unit	velocity units (SDO is in user units and the PDO is in RPM
Value range	(-2^{31}) to $(2^{31}-1)$
Default value	—
Float scaling	1000:1
EEPROM	no

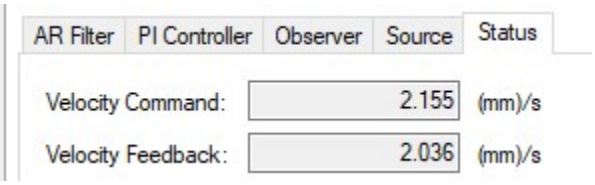
The statement that the PDO is in RPM is only partially true.
It is in RPM if you're using Workbench Units but if you're using DS402 scaling then the PDO is scaled accordingly (this will be covered shortly).

Workbench Units FBUS.PARAM05 bit 4=0 (Workbench Units)

Example #1

10mm/rev ballscrew
5:1 gearbox





2 mm/sec * 5 rev of motor/10 mm*60 sec/min= 2*5*60/10= 60 rpm (motor)

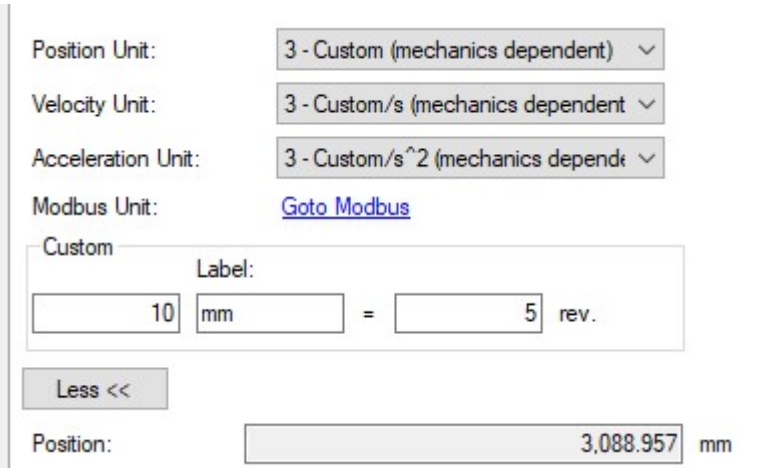
If you're not using DS402 scaling then the value is in RPM (*1000) regardless of the Velocity Unit in Workbench.

DS402 Scaling:

606Ch (velocity actual value) PDO with FBUS.PARAM05 bit 4=1 (DS402 scaling)

$$PDO\ Value = Target\ Velocity(rpm) \times \frac{DS402.VELSCALENUM}{DS402.VELSCALEDENOM} \times 1000$$

$$Target\ Velocity(rpm) = PDO\ Value \times \frac{DS402.VELSCALEDENOM}{DS402.VELSCALENUM} \times \frac{1}{1000}$$



Suppose the VL.FB in Workbench is 2 mm/sec.

$$2\,\frac{mm}{sec}\times\frac{5\,rev\;of\;motor}{10\,mm}\times 60\frac{sec}{min}=60\,rpm$$

To determine the velocity scale factor for the PDO in mm/sec.

$$\frac{mm}{sec}=60\,\frac{rev}{min}\times\frac{1\;min}{60\,sec}\times\frac{10\,mm}{5\,rev}$$

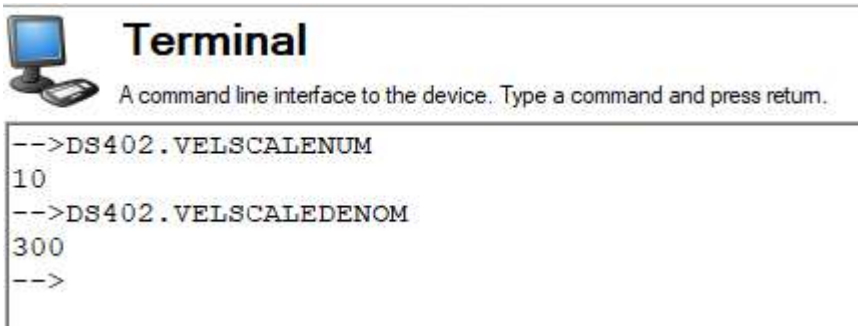
$$PDO\;Value=Target\;Velocity(rpm)\times\frac{DS402.VELSCALENUM}{DS402.VELSCALEDENOM}\times 1000$$

$$\frac{mm}{sec}=60\,\frac{rev}{min}\times\left[\frac{1\;min}{60\,sec}\times\frac{10\,mm}{5\,rev}\right]$$

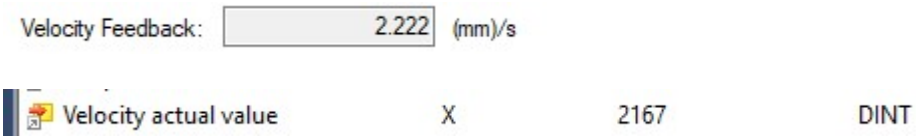
$$\frac{mm}{sec}=60\,\frac{rev}{min}\times\left[\frac{10}{300}\right]$$

Therefore, in this example

DS402.VELSCALENUM=10
DS402.VELSCALEDENOM=300



$PDO\ Value = Target\ Velocity(rpm) \times \frac{10}{300} \times 1000$=2000 (2.000 mm/sec)



The converse can be calculated from the PDO value.

$$Target\ Velocity(rpm) = PDO\ Value \times \frac{DS402.VELSCALEDENOM}{DS402.VELSCALENUM} \times \frac{1}{1000}$$

$$Target\ Velocity(rpm) = 2000 \times \frac{300}{10} \times \frac{1}{1000} = 60\ RPM$$

Position Monitoring In Profile Torque Mode

The feedback position can be read via PDO with either object 6063h or 6064h.

6063 is always based on FB1.PSCALE and doesn't change with FBUS.PARAM05 bit 4.

6064 changes based on FBUS.PARAM05 bit 4 whether Workbench or DS402 scaling is used.

Using Workbench Units FBUS.PARAM05 bit 4=0

6063h (Actual Position)

$6063h\ (Position\ Actual\ Internal\ Value\ )\ \ PDO\ Value = number\ of\ revs \times 2^{FB1.PSCALE}$

Or

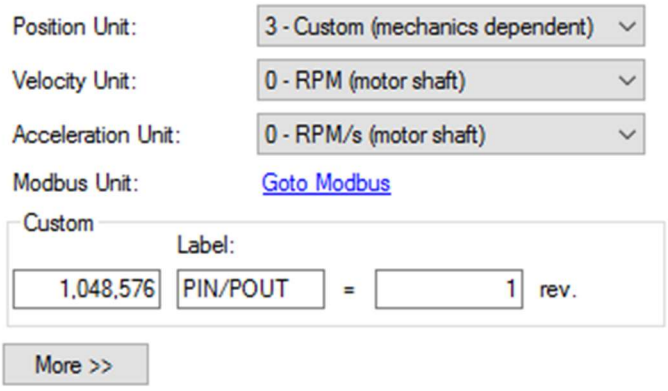
6063h (Position Actual Internal Value) PDO Value=

$$PDO\ Value = PL.FB \times \frac{2^{FB\ .PSCALE}}{UNIT.PIN}$$

Note UNIT.POUT has no effect on the PDO value so scaling will assume 1 rev.

Example:

If it is desired for PL.FB (position feedback) to read the same value in Workbench as the PDO value then the position unit can be set for 2^FB1.PSCALE (default is 2^20=1,048,576 counts per rev).



Workbench PL.FB=1048576 (and based on your scaling the motor has turned 1 rev from the 0 position).

PL.FB=1048576

Unit.Pout=1

Unit.Pin=1048576

FB1.PSCALE=20

$$6063\ PDO\ Value = PL.FB \times \frac{2^{FB1.PSCALE}}{Unit.Pin}$$

$$6063\ PDO\ Value = 1048576 \times \frac{2^{20}}{1048576} = 1048576$$

If the motor turned 2 revs and the PL.FB=2097152 then

$$6063\ PDO\ Value = 2097152\ \times \frac{2^{20}}{1048576} = 2097152$$

Next looking at object 6064 (still based on the FBUS.PARAM05 bit 4=0 as shown above):

6064 Position Actual Value= number of revs * UNIT.PIN

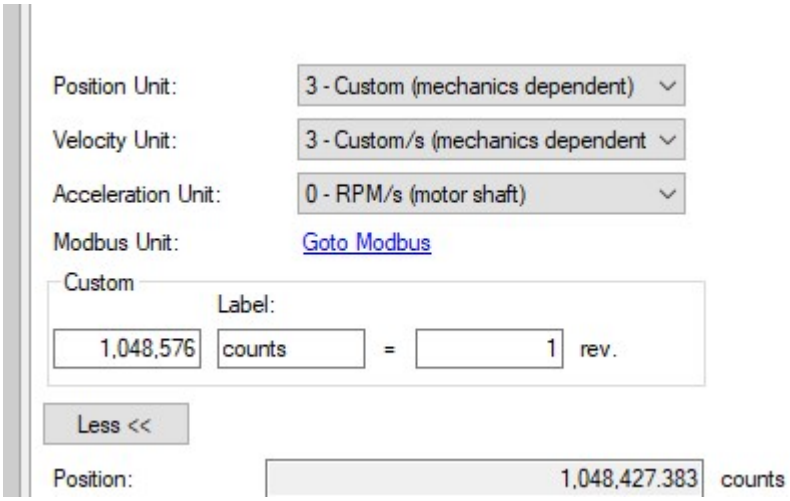
Note UNIT.POUT has no effect on the PDO value so scaling will assume 1 rev.

Example 1:

PL.FB=1048576 (1 rev)

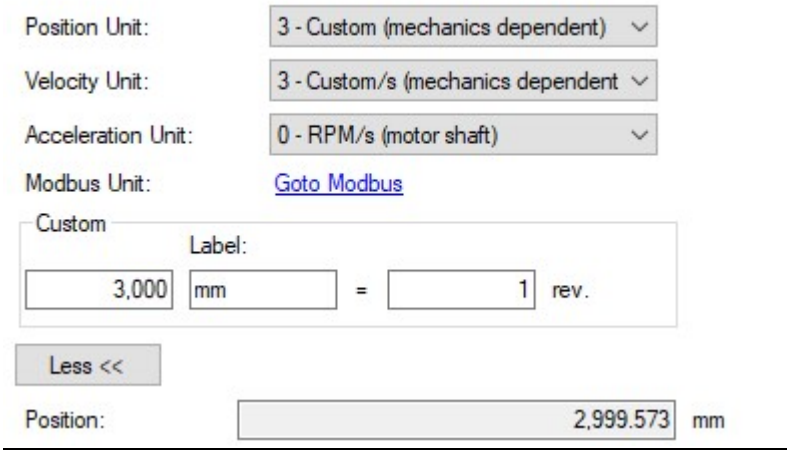
6064 PDO value=1048576 since UNIT.PIN=1048576 in 1 rev

6064 SDO value is 1 rev for UNIT.PIN/UNIT.POUT= 1048576/1=1048576



Position actual internal value		1048428	DINT	4.0	66.0	Input	0
Position actual value	X	1048428	DINT	4.0	70.0	Input	0

Example#2:



Without moving the motor position at 1 rev the new scaling displayed PL.FB at 3000mm and object 6063h (Position Actual Internal value) remained at 1048426 but 6064 (Position Actual Value) displayed 3000.

Position actual internal value		1048426	DINT	4.0	66.0	Input	0
Position actual value	X	3000	DINT	4.0	70.0	Input	0

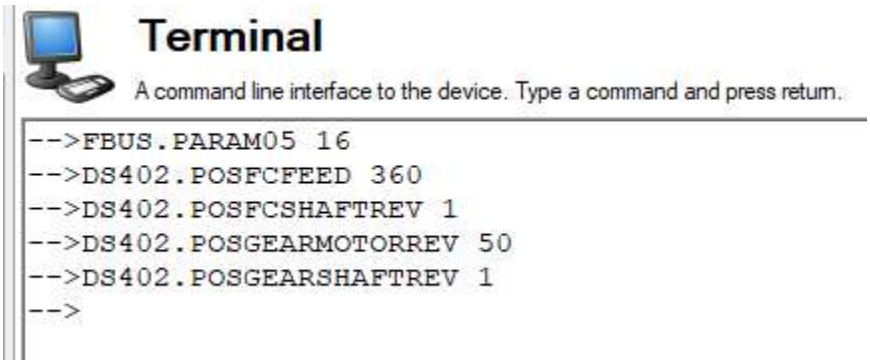
DS402 Units Scaling (FBUS.PARAM05 bit 4=1)

Object	Subindex	Description	AKD Parameter Equivalent	Additional Description
6091h	1	Gear Ratio-Motor Rev	DS402.POSGEARMOTORREV	Gearbox input revs (motor revs)
6091h	2	Gear Ratio-Shaft Rev	DS402.POSGEARSHAFTREV	Gearbox output shaft revs
6092h	1	Feed Constant-Feed	DS402.POSFCFEED	Number of units per shaft rev
6092h	2	Feed Constant-Shaft Rev	DS402.POSFCSHAFTREV	Number of shaft revs

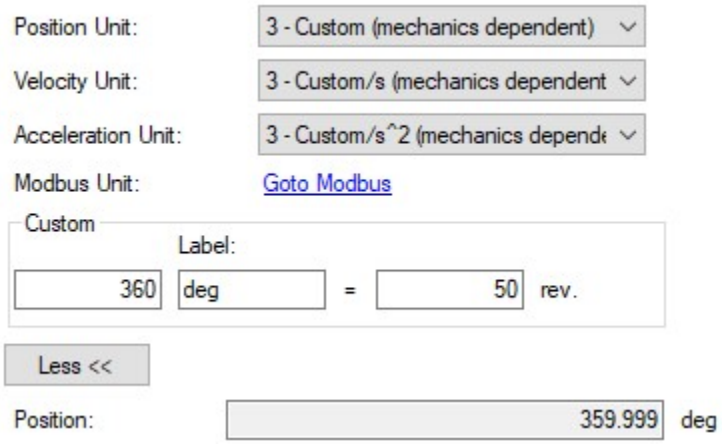
Example#1:

50:1 gearbox
Rotary table
Units over fieldbus, degrees

Object	Subindex	Description	AKD Parameter Equivalent	Additional Description	Value
6091h	1	Gear Ratio-Motor Rev	DS402.POSGEARMOTORREV	Gearbox input revs (motor revs)	50
6091h	2	Gear Ratio-Shaft Rev	DS402.POSGEARSHAFTREV	Gearbox output shaft revs	1
6092h	1	Feed Constant-Feed	DS402.POSFCFEED	Number of units per shaft rev	360
6092h	2	Feed Constant-Shaft Rev	DS402.POSFCSHAFTREV	Number of shaft revs	1



Workbench was scaled for 360 degrees (load)= 50 motor revs.
Position feedback was moved to 360 degrees physically.



PDO Values

6063h (Position actual internal value)= 50 rev * 1048576=52,428,800 (theoretical) with FB1.PSCALE at default 20.

6064h (Position actual value)=number of revs * (feed constant)/(gear ratio)

6064h (Position actual value)= number of revs* feed constant/shaft rev/gear ratio motor rev/gear ratio shaft rev

6064h (Position Actual Value)$= number\ of\ revs \times \frac{\frac{Feed\ Constant}{Feed\ Shaft\ Rev}}{\frac{Gear\ Motor\ Shaft\ Rev}{Gear\ Shaft\ Rev}}$

6064h (Position Actual Value)$= number\ of\ revs \times \frac{\frac{360}{1}}{\frac{50}{1}} = number\ of\ revs * 360/50$

6064h (Position Actual Value)$= 50\ revs * \frac{360}{50} = 360\ degrees$

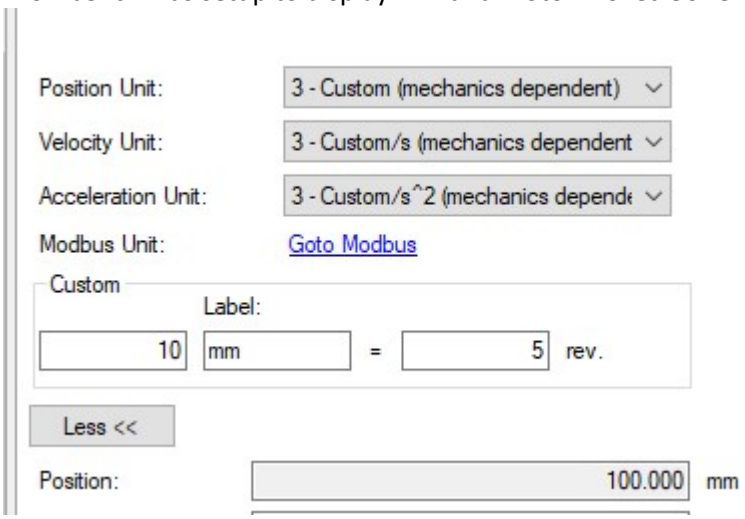
Position actual internal value		52428646	DINT	4.0
Position actual value	X	360	DINT	4.0

Example #2:

10mm/rev ballscrew
5:1 gearbox
units over fieldbus, mm

Object	Subindex	Description	AKD Parameter Equivalent	Additional Description	Value
6091h	1	Gear Ratio-Motor Rev	DS402.POSGEARMOTORREV	Gearbox input revs (motor revs)	5
6091h	2	Gear Ratio-Shaft Rev	DS402.POSGEARSHAFTREV	Gearbox output shaft revs	1
6092h	1	Feed Constant-Feed	DS402.POSFCFEED	Number of units per shaft rev	10
6092h	2	Feed Constant-Shaft Rev	DS402.POSFCSHAFTREV	Number of shaft revs	1

Workbench was setup to display mm and motor moved 50 revolution (PL.FB=100 mm).




```
-->FBUS.PARAM05 16
-->DS402.POSFCFEED 10
-->DS402.POSFCSHAFTREV 1
-->DS402.POSGEARMOTORREV 5
-->DS402.POSGEARSHAFTREV 1
-->
```

6063h (Position actual internal value)= 50 rev * 1048576=52,428,800 (theoretical) with FB1.PSCALE at default 20.

6064h (Position actual value)=number of revs * (feed constant)/(gear ratio)

6064h (Position actual value)= number of revs* feed constant/shaft rev/gear ratio motor rev/gear ratio shaft rev

6064h (Position Actual Value)$= number\ of\ revs \times \frac{\frac{Feed\ Constant}{Feed\ Shaft\ Rev}}{\frac{Gear\ Motor\ Sha\quad Rev}{Gear\ Shaft\ Rev}}$

6064h (Position Actual Value)$= number\ of\ revs \times \frac{\frac{10}{1}}{\frac{5}{1}} = number\ of\ revs * 10/5$

6064h (Position Actual Value)$= 50\ revs * \frac{10}{5} = 100\ mm$

Position actual internal value		52428644	DINT	4.0	66.0
Position actual value	X	100	DINT	4.0	70.0

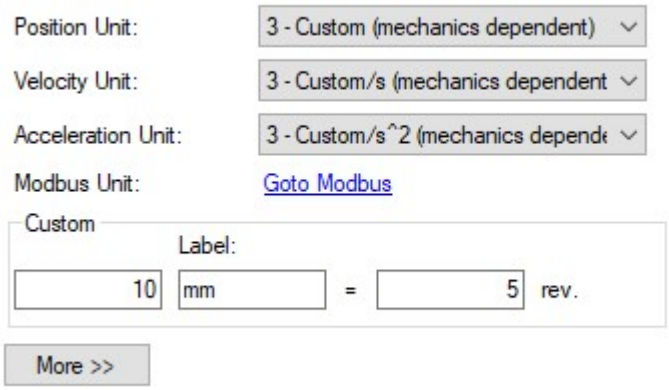
Other related objects and behavior

207Fh (maximum velocity) writes to IL.VLIMIT.

60FFh is shown in the manual to be in “increments”.

If FBUS.PARAM05 bit 4=0 (Workbench Units) then the decimal value of 207Fh (1/1000) is the value written to IL.VLIMIT of whatever velocity units are being used in Workbench.

Example:



207Fh= 1000 then IL.VLIMIT= 1.000 mm/s

FBUS.PARAM05 bit 4=1 (DS402 Scaling)

```
ds402-->DS402.POSFCFEED
1000
ds402-->DS402.POSFCSHAFTREV
1
ds402-->DS402.POSGEARMOTORREV
5
ds402-->DS402.3ADDPOSGEARSHAFTREV
1
ds402-->DS402.VELSCALENUM
10
ds402-->DS402.VELSCALEDENOM
300
-->
```

There was no effect on the value written to IL.VLIMIT except the DS402.VELSCALENUM and DS402.VELSCALEDENOM. This is the same convention as described before with606Ch (velocity actual value 606C

$$PDO\ Value = Target\ Velocity(rpm) \times \frac{10}{300} \times 1000$$

Suppose the target velocity limit is 2 mm/sec.

2 mm/sec * 5 rev of motor/10 mm*60 sec/min= 2*5*60/10= 60 rpm (motor)

$PDO\ Value = 60\ rpm \times \frac{10}{300} \times 1000$=2000 (2.000 mm/sec in Workbench)

The CANopen dictionary doesn't correlate object 207Fh with IL.VLIMIT in the documentation but the IL.VLIMIT entry in Workbench Help does.

6.7.2.3 Object 207Fh: Maximum Velocity

Maximum velocity This parameter limits the velocity of the motor in profile torque and cyclic synchronous torque mode. The scaling is the same as for object 60FFh.

Index	207Fh
Name	Maximum velocity
Object code	VAR
Data type	UNSIGNED32
Category	optional
Access	RW
PDO mapping	possible
Value range	
Default value	0, means no limitation

IL.VLIMIT

Description

IL.VLIMIT sets the velocity limit for operation in torque mode.

When set to a non-zero value, the current supplied to the motor will be limited to prevent the drive from accelerating beyond -IL.VLIMIT / IL.VLIMIT.

Fieldbus	Index/Subindex	Object Start Version
EtherCAT COE and CANopen	207Fh/0	M_01-14-04-000

60E0h (positive torque limit value) and 60E1h (negative torque limit value) provide a method for changing the drive's current limits individually so the IL.LIMITP and IL.LIMITN do not have to share the same magnitude value (i.e. +1.5, -1.5 but instead can be +1.5, -3.0).

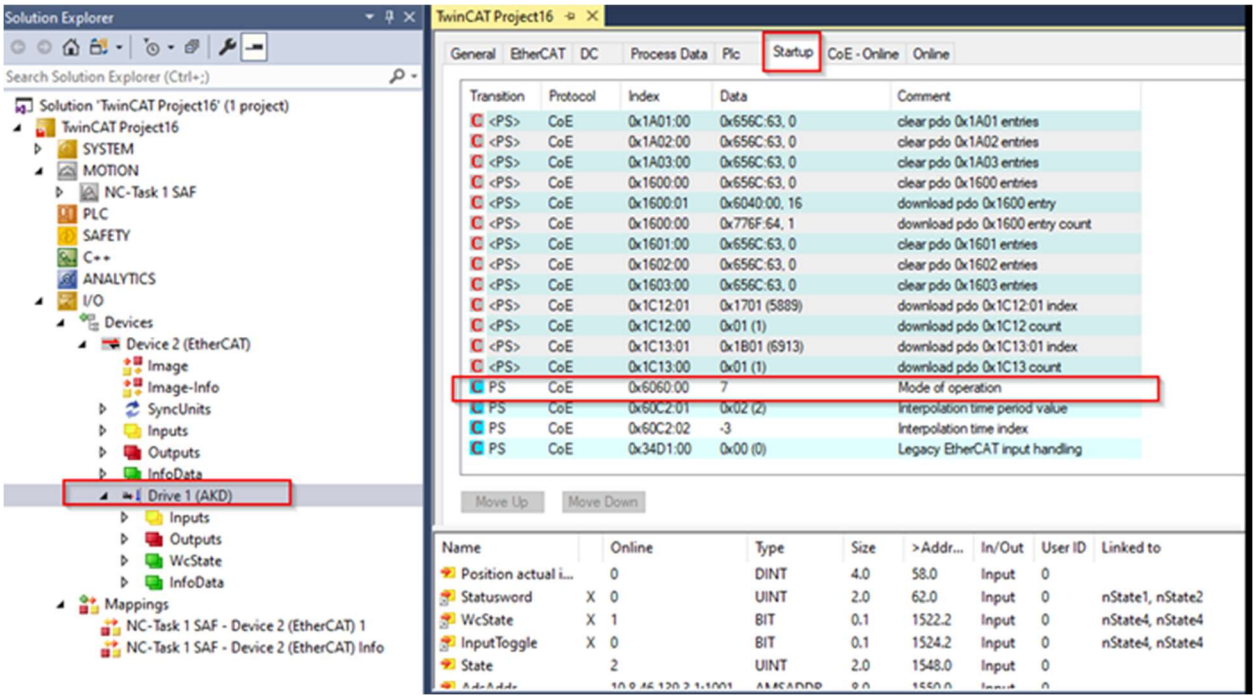
Object 6073h (max current) writes to both limits with the same magnitude but opposite in sign.
Also note a change in value of object 6073h (max. current) also changes object 6072 (max torque) to the same value in the CoE Online.

Other notable behavior is if either 60E0h (positive torque limit value) or 60E1h (negative torque limit value) is changed then objects 6072(max torque) and 6073(max current) will change to the lower of the two values.

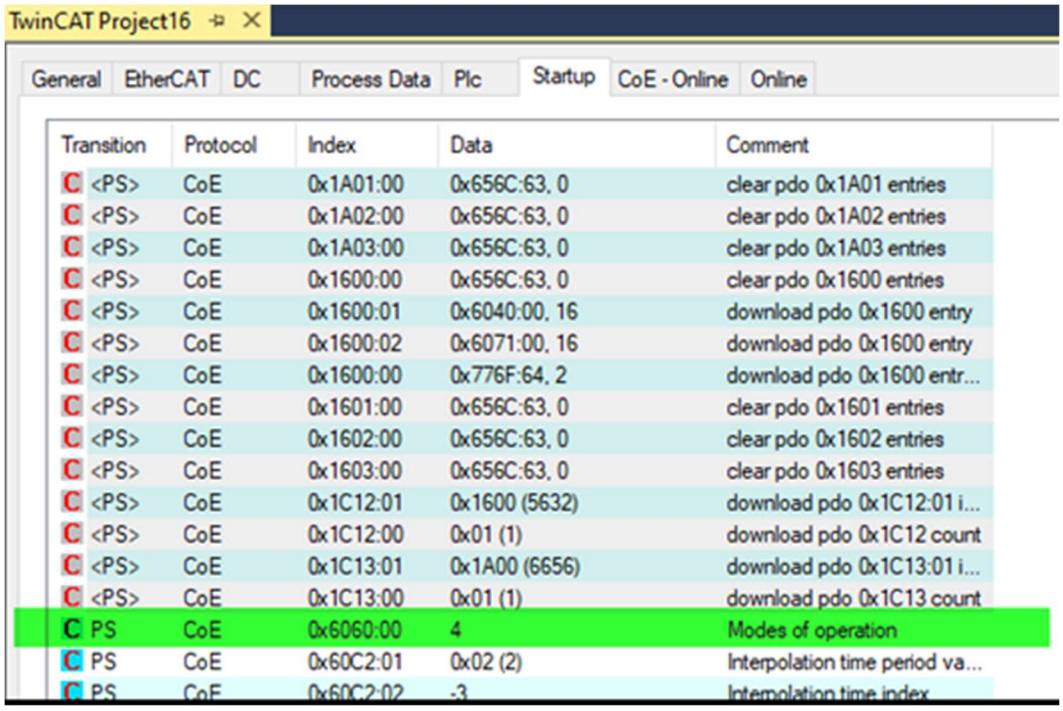
Conversely if 6073h is changed for example to a new value with CoE Online then 6062 (max torque), 60E0h (positive torque limit value), and 60E1h (negative torque limit value) all change to the new value.

Setting the Torque Setpoint Demonstration

The mode of operation can be changed via COE or via PDO if object 6060 is mapped as a PDO or if the axis is to always operate in Profile Torque mode
as Dan mentioned, you can edit the Startup script.
The XML file defaults the startup script to Mode of Operation=7 Interpolated Position mode on the AKD1G.



Here I opted to change the Startup for 6060=4 (Profile Torque Mode).



The AKD CANopen Communications manual details DS402 Profile Torque mode which also applies to EtherCAT.
Note per the CANopen manual object 2071h (target current) and 2077h (current actual value) can be used as
An alternative to the DS402 objects 6071h (target torque) and 6077h (torque actual value).
The nuance of the 6xxx objects versus 2xxx objects is units and scaling.
For this demonstration I used the DS402 6xxx objects.

6.7 Profile Torque Mode (tq) (DS402)

6.7.1 General Information

The profile torque mode enables the processing of torque setpoints and the associated current.

6.7.1.1 Objects that are defined in this section

Index	Object	Name	Type	Access
2071h	VAR	Target current	INTEGER32	R/W
2077h	VAR	Current actual value	INTEGER32	R/O
6071h	VAR	Target torque	INTEGER16	R/W
6073h	VAR	Max current	UNSIGNED16	R/W
6077h	VAR	Torque actual value	INTEGER16	R/O

6.7.1.2 Objects that are defined in other sections

None.

6.7.2 Object description

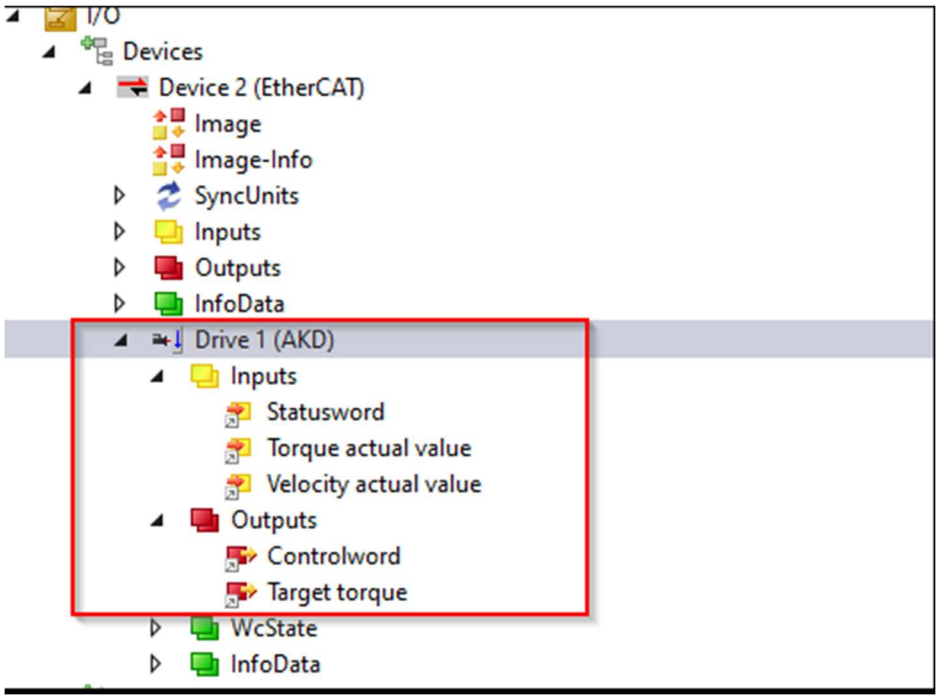
6.7.2.1 Object 2071h: Target Current

This parameter can be used alternatively to the DS402 parameter 6071h and is the input to the torque controller. The value is scaled in mA (milli Amperes).

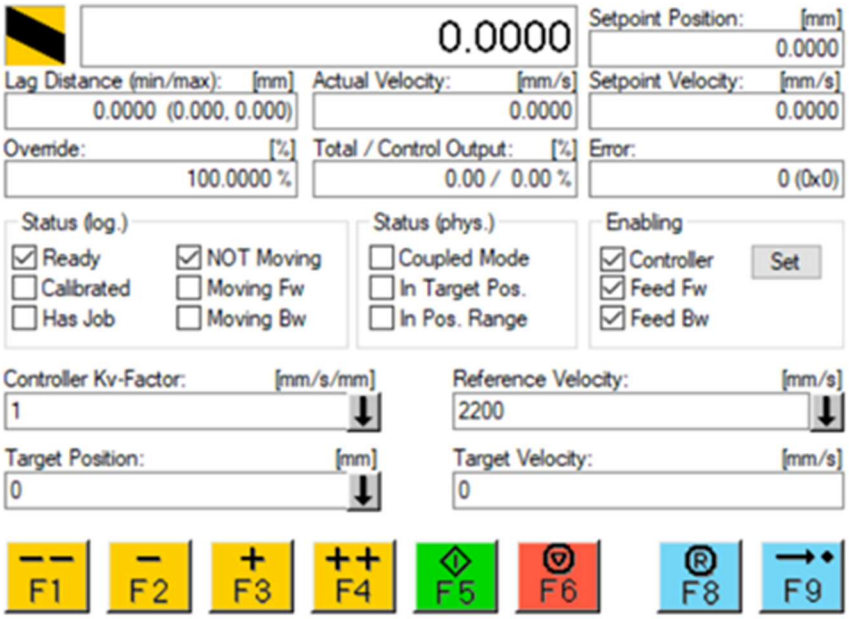
Index	2071h
Name	Target current
Object code	VAR
Data type	INTEGER 32
Category	optional

Access	RW
PDO mapping	possible
Value range	depends on DRV.IPEAK and MOTOR.IPEAK
Default value	0

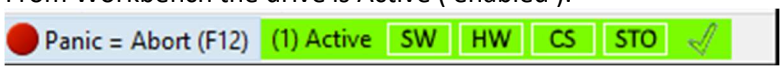
I used flexible PDO mapping as shown below. Keep in mind there may be other drive parameters needed in the application
such as IL.LIMITN, IL.LIMITP, and others. I am demonstrating the minimum.



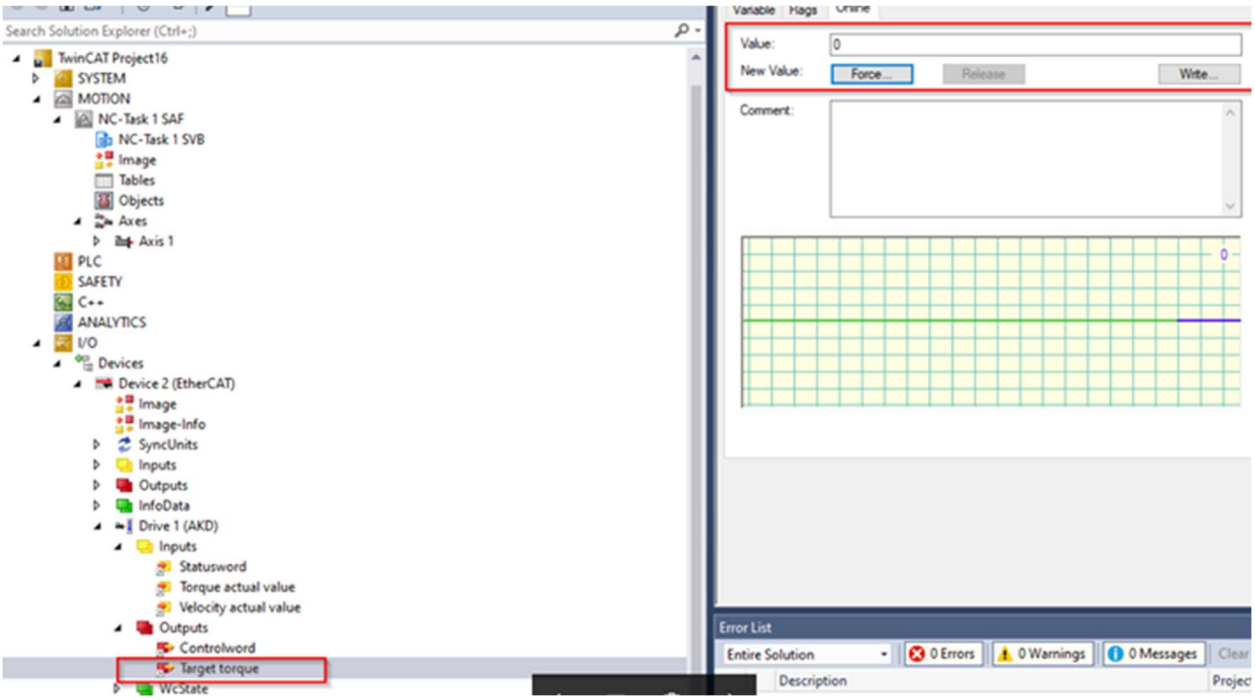
I software enabled the drive using the Console.



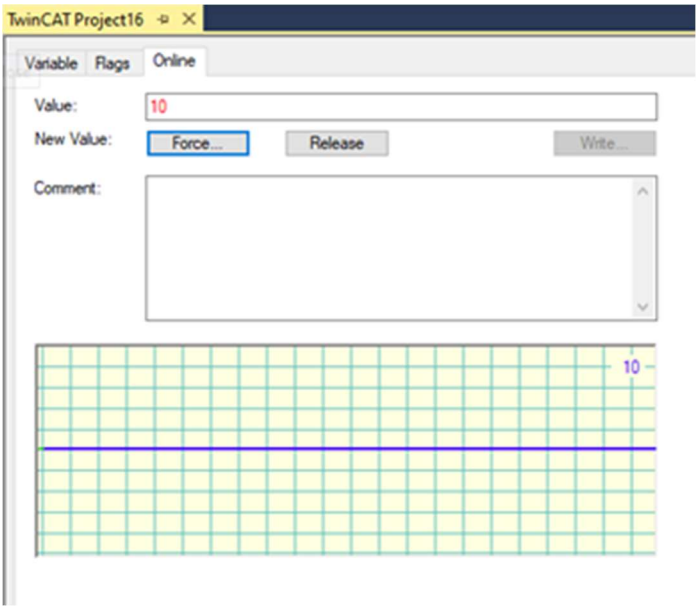
From Workbench the drive is Active (enabled).



I elected to force the Target Torque value to demonstrate. You will likely set this value in your Beckhoff programming.



I set the value to 10 in my case.



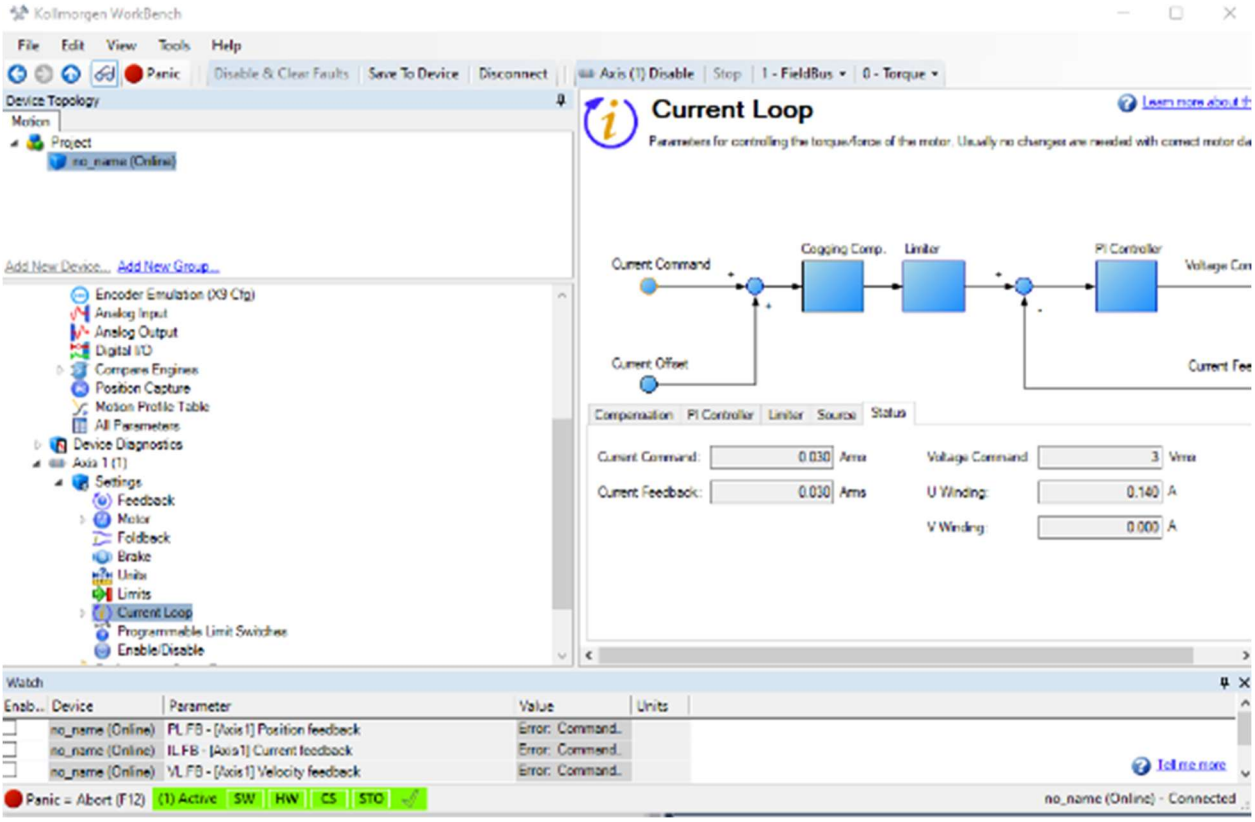
I observed a Current Command of 0.030 Arms.

Per the attached document

Target Torque(fieldbus value)=(IL.CMD/Drive Continuous Rating)*1000

IL.CMD= Target Torque(fieldbus value)*Drive Continuous Rating/1000

IL.CMD= 10 * 3/1000= 0.03 Arms as observed below


Kollmorgen WorkBench
File Edit View Tools Help
Panic
Disable & Clear Faults
Save To Device
Disconnect
Axis (1) Disable
Stop
1 - FieldBus
0 - Torque
Device Topology
Motion
Project
no_name (Online)
Add New Device...
Add New Group...
Encoder Emulation (X9 Cfg)
Analog Input
Analog Output
Digital I/O
Compare Engines
Position Capture
Motion Profile Table
All Parameters
Device Diagnostics
Axis 1 (1)
Settings
Feedback
Motor
Foldback
Brake
Units
Limits
Current Loop
Programmable Limit Switches
Enable/Disable
Current Loop
Parameters for controlling the torque/force of the motor. Usually no changes are needed with correct motor da
Current Command
Cogging Comp.
Limiter
PI Controller
Current Offset
Compensation
PI Controller
Limiter
Source
Status
Current Command:
0.030
Arms
Current Feedback:
0.030
Arms
Voltage Command
3
Vrms
U Winding:
0.140
A
V Winding:
0.000
A
Watch
Enab...
Device
Parameter
Value
Units
no_name (Online)
PL FB - [Axis1] Position feedback
Error: Command..
no_name (Online)
IL FB - [Axis1] Current feedback
Error: Command..
no_name (Online)
VL FB - [Axis1] Velocity feedback
Error: Command..
Tell me more
Panic = Abort (F12)
(1) Active
SW
HW
CS
STO
no_name (Online) - Connected