

AKD2G Touch Probes Rev. C 7-22-24

Per the AKD2G Help the touch probes differ from the AKD1G in that the capture engine (CAP1 and CAP2 are not used). Currently the touch probe values (i.e. function/control, status, source, position positive and negative values, time stamps, and counters) are only accessible over EtherCAT or CANopen in the AKD2G and cannot be queried from Workbench (i.e. All Parameters, Terminal).

Touch Probes

Each touch probe can capture two positions, the position on the rising and the position of the falling edge of the trigger input.

The AKD2G touch probes conform with the EtherCAT ETG6010 specification "CiA402 Implementation Directive" and CANopen DS402.

On AKD2G, the touch probes are separate from the drive's position capture channels, CAP1 and CAP2. The touch probes use their own dedicated hardware in the drive. The configuration and status of the touch probes will not be available by the CAP#. keywords.

These are the EtherCAT/CANopen objects AKD2G supports.

Axis 1 Index	Axis 2 Index	Name
60B8h	68B8h	Touch probe function / control
60B9h	68B9h	Touch probe status
60BAh	68BAh	Touch probe 1 position positive value
60BBh	68BBh	Touch probe 1 position negative value
60BCh	68BCh	Touch probe 2 position positive value
60BDh	68BDh	Touch probe 2 position negative value
60D0h	68D0h	Touch probe source
60D1h	68D1h	Touch probe 1 time stamp positive value
60D2h	68D2h	Touch probe 1 time stamp negative value
60D3h	68D3h	Touch probe 2 time stamp positive value
60D4h	68D4h	Touch probe 2 time stamp negative value
60D5h	68D5h	Touch probe 1 positive edge counter
60D6h	68D6h	Touch probe 1 negative edge counter
60D7h	68D7h	Touch probe 2 positive edge counter
60D8h	68D8h	Touch probe 2 negative edge counter

The captured position values (i.e. 60BA, 60BB, 60BC, etc.) are scaled by CANopen Position Scaling (i.e. Gear Ratio, Feed, etc.).

In this application note Axis 1 was setup accordingly:

? Units

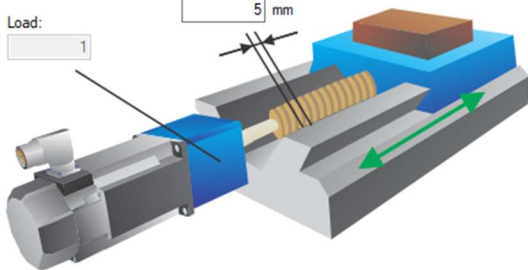
You can select the units used for positions, velocities and accelerations.

Select Type of Mechanics: Lead Screw

☒ None
☐ Turns
☐ Teeth

Motor: 1 Load: 1

Lead: 5 mm



Position Unit: 3 - Custom (mechanics dependent)

Velocity Unit: 3 - Custom/s (mechanics dependent)

Acceleration Unit: 3 - Custom/s^2 (mechanics dependent)

Custom Position Unit: mm

Modbus Unit: Goto Modbus

More >>

DS402 scaling was used:

Terminal

A command line interface to the device. Type a command and press return.

```
ds402 scaling-->AXIS1.CANOPEN.FCPRIMARY.FEED 5000
ds402 scaling-->AXIS1.CANOPEN.FCPRIMARY.SHAFTREV 1
ds402 scaling-->AXIS1.CANOPEN.GEARPRIMARY.MOTORREV 1
ds402 scaling-->AXIS1.CANOPEN.GEARPRIMARY.SHAFTREV 1
-->
```

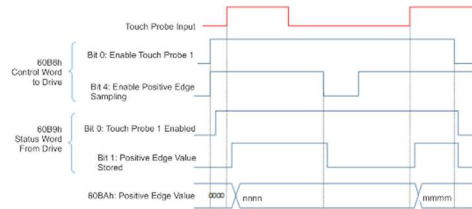
The PDO value of the position capture will then be the Workbench value x 1000.

Touch Probe Source: Note negative values are manufacturer specific and positive values are standard.

60D0h, 68D0h, Touch Probe Source. The following table shows how AKD2G signals are mapped to the touch probe source entry in the object dictionary

NOTE	
A few sources appear in both the standard and the manufacturer specific ranges to provide consistency.	
60D0h, 68D0h	Description
-41 to -42	Z pulse for Axis 1 to 2
-31 to -35	Z pulse for Feedback 1 to 5 As FB1, 2, 4, and 5 do not support Z pulses then these will not be shown. When we support SFA on FB 1 and 2 then Z pulse may be possible. X23 is optional so if not fitted then -33 will not be valid.
-21 to -26	DIO1 to DIO6 When X22 is not fitted options -21 and -22 will not be valid. When X23 is not fitted options -23 to -26 will not be valid.
-1 to -12	DIN1 to DIN12 When X22 is not fitted options -9 to -12 will not be valid.
0	Reserved
1	DIN1. Fast Opto
2	DIN2. Fast Opto
3-4	Reserved
5	Valid if PLFBSOURCE is using a feedback that supports a Z pulse.
6 to 32767	Reserved

The following diagram shows the sequence for controlling the touch probe feature.



It is worth mentioning there are Fixed PDOs associated with Touch Probes.

Fixed PDO Mappings

If the EtherCAT master in use does not support dynamic mapping, various ready-to-use mappings can be selected for cyclic data exchange using [1C12h](#) and [1C13h](#). If the master permits, dynamic mapping should be preferred as the maps can be customized to meet exact needs. Using dynamic mapping does not impact performance and performs equivalent to fixed maps.

17xxh objects are used for drive input maps and 1Bxxh objects are used for drive output maps.

Use the sequence below to select the fixed command value mapping 0x1700 via SDOs:

- SDO write access to object 0x1C12Sub0 Data:0x00
- SDO write access to object 0x1C12Sub1 Data:0x1700
- SDO write access to object 0x1C12Sub0 Data:0x01

The objects, which are mapped into the fixed PDOs can be read via the subindices 1 to n of the above indices. The number of mapped entries is available by reading subindex 0 of the above indices.

Drive fixed maps

1620h	Digital Outputs (3601h)
1A20h	Digital Input states (3580h)

Per axis fixed maps (2nd axis uses 20h offsets, ie: 1700h is axis 1 and 1720h is axis 2)

1700h	CSP map: Controlword (6040h), Target Position (607Ah)
1701h	PV map: Controlword (6040h), Target Velocity (60FFh)
1702h	1702h PT map: Controlword (6040h), Target Torque (6071h)
1703h	Reserved
1704h	Touch Probe Control (60B8h)
1800h	CSP map: Statusword (6041h), Position Actual (6064h), Following Error (60F4h)
1801h	PV map: Statusword (6041h), Position Actual (6064h), Velocity Actual (606Ch)
1802h	PT map: Statusword (6041h), Position Actual (6064h), Torque Actual (6077h)
1803h	Touch Probe Status (60B9h)
1804h	Touch Probe 1 Position Positive Value (60BAh), Touch Probe 1 Position Negative Value (60BBh)
1805h	Touch Probe 2 Position Positive Value (60BCh), Touch Probe 2 Position Negative Value (60BDh)
1806h	Digital Inputs (60FDh)

For demonstration and the examples in this application note the PDOs related to Touch Probes and were used and added to the Watch in TwinCAT 3.

- ▲ Drive 1 (AKD2G Dual Axis FS1)
 - ▲ Inputs
 - Statusword - Axis 1
 - ▲ Inputs_1
 - Touch probe status - Axis 1
 - ▲ Inputs_2
 - Touch probe 1 position positive value - Axis 1
 - Touch probe 1 position negative value - Axis 1
 - ▲ Inputs_3
 - Touch probe 2 position positive value - Axis 1
 - Touch probe 2 position negative value - Axis 1
 - ▲ Inputs_4
 - Touch probe status - Axis 2
 - ▲ Inputs_5
 - Touch probe 1 position positive value - Axis 2
 - Touch probe 1 position negative value - Axis 2
 - ▲ Inputs_6
 - Touch probe 2 position positive value - Axis 2
 - Touch probe 2 position negative value - Axis 2
 - ▲ Outputs
 - Touch probe function - Axis 1
 - ▲ Outputs_1
 - Touch probe function - Axis 2

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe status - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 1 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	

Example 1: Use Touchprobe 1-Axis 1 to continuously sample on the positive edge of DIN1.

60B8h, 68B8h Touch probe function - Axis

Controls the function of the two touch probes associated with an axis.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0		Disable touch probe 1
	1		Enable touch probe 1
1	0		Trigger first event
	1		Trigger continuous
3, 2	00b	1	Trigger with touch probe 1 input (DIN1)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 01h
	11b		Reserved
4	0		Disable sampling at positive edge of touch probe 1
	1		Enable sampling at positive edge of touch probe 1
5	0		Disable sampling at negative edge of touch probe 1
	1		Enable sampling at negative edge of touch probe 1
6, 7	-		Reserved
8	0		Disable touch probe 2
	1		Enable touch probe 2
9	0		Trigger first event
	1		Trigger continuous
11, 10	00b	2	Trigger with touch probe 2 input (DIN2)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 02h
	11b		Reserved
12	0		Disable sampling at positive edge of the touch probe 2
	1		Enable sampling at positive edge of the touch probe 2
13	0		Disable sampling at negative edge of the touch probe 2
	1		Enable sampling at negative edge of the touch probe 2
14, 15	-		Reserved

In this example the touch probe function-Axis 1 (control word) is to be set to 2#10011 (19).

The Touch probe function-Axis 1 is zero at first.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe status - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	

Next to enable Touch Probe 1 Touch Probe Function-Axis 1 was set to 2#11001 (19) by Online Forcing.

The Touch Probe Status changes to a value of 1 indicating the touch probe is enabled (armed).

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	19	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	246020	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

60B9h, 68B9h Touch probe status - Axis

The status of the two touch probes associated with an axis. The EtherCAT or CANopen master can use this value to check if 60Bah to 60BDh contain values. If a touch probe is disabled, bit 0, then the latched bits, bits 1 and 2, are always 0.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0		Touch probe is disabled
	1		Touch probe is enabled
1	0	1	Touch probe 1 no positive edge value stored
	1		Touch probe 1 positive edge position stored
2	0		Touch probe 1 no negative edge value stored
	1		Touch probe 1 negative edge position stored
3 to 7	-		Reserved
8	0	2	Touch probe 2 is disabled
	1		Touch probe 2 is enabled
9	0		Touch probe 2 no positive edge value stored
	1		Touch probe 2 positive edge position stored
10	0		Touch probe 2 no negative edge value stored
	1		Touch probe 2 negative edge position stored
11 to 15	-		Reserved

It is important to note above from a previous time the touch probe was enabled and triggered there is a residual value in Touch Probe 1 position positive value-Axis 1 (246020) in the watch window but bit 1 of touch probe status is 0 indicating "Touch probe 1 no positive edge value stored". When the touchprobe was disabled previously, bit 1 of the touch probe status was cleared.

On rising edge of DIN1 the status changes from 1 to 3 indicating Touch Probe 1 positive edge is stored and a new touch probe 1 positive edge value-axis 1 is shown.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	19	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	368591	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

A value of 3 is 2#11.

60B9h, 68B9h Touch probe status - Axis

The status of the two touch probes associated with an axis. The EtherCAT or CANopen master can use this value to check if 60B9h to 60BDh contain values. If a touch probe is disabled, bit 0, then the latched bits, bits 1 and 2, are always 0.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0	1	Touch probe is disabled
	1		Touch probe is enabled
1	0	1	Touch probe 1 no positive edge value stored
	1		Touch probe 1 positive edge position stored
2	0	2	Touch probe 1 no negative edge value stored
	1		Touch probe 1 negative edge position stored
3 to 7	-		Reserved
8	0	2	Touch probe 2 is disabled
	1		Touch probe 2 is enabled
9	0	2	Touch probe 2 no positive edge value stored
	1		Touch probe 2 positive edge position stored
10	0	2	Touch probe 2 no negative edge value stored
	1		Touch probe 2 negative edge position stored
11 to 15	-		Reserved

Since this is a continuous trigger Axis 1 can be moved to change the feedback position and DIN1 can be toggled low and then high again for a new capture.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	19	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	546301	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

It is worth noting the feedback position in Workbench is displayed as the PDO value above divided by 1000 (integer to float).

Watch			
Device	Parameter	Value	
no-name (Online)*	AXIS1.PL.FB	546.301	mm

Example 2: Continue to use Touch probe 1 positive edge trigger but also add negative edge trigger as well. Add Touch Probe 2 positive edge trigger functionality.

For this example the following must be set in the Touch Probe Function:

60B8h, 68B8h Touch probe function - Axis #

Controls the function of the two touch probes associated with an axis.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0		Disable touch probe 1
	1		Enable touch probe 1
1	0		Trigger first event
	1		Trigger continuous
3, 2	00b	1	Trigger with touch probe 1 input (DIN1)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 01h
	11b		Reserved
4	0		Disable sampling at positive edge of touch probe 1
	1		Enable sampling at positive edge of touch probe 1
5	0		Disable sampling at negative edge of touch probe 1
	1		Enable sampling at negative edge of touch probe 1
6, 7			Reserved
8	0		Disable touch probe 2
	1		Enable touch probe 2
9	0		Trigger first event
	1		Trigger continuous
11, 10	00b	2	Trigger with touch probe 2 input (DIN2)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 02h
	11b		Reserved
12	0		Disable sampling at positive edge of the touch probe 2
	1		Enable sampling at positive edge of the touch probe 2
13	0		Disable sampling at negative edge of the touch probe 2
	1		Enable sampling at negative edge of the touch probe 2
14, 15			Reserved

The Touch probe function-Axis1 then will be set to the following.

2#1 0011 0011 0011 is 4915 (dec).

Start with the Touch probe function- Axis1 set to 0.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	246020	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

Then change the Touch probe function Axis1 to the following.

2#1 0011 0011 0011 is 4915 (dec).

After setting the touch probe function the touch probe status changes to 257 (decimal).

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	4915	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	257	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	546301	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

257 (decimal) is 2#1 0000 0001.

60B9h, 68B9h Touch probe status - AxisX

The status of the two touch probes associated with an axis. The EtherCAT or CANopen master can use this value to check if 60BAh to 60BDh contain values. If a touch probe is disabled, bit 0, then the latched bits, bits 1 and 2, are always 0.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0	1	Touch probe is disabled
	1		Touch probe is enabled
1	0		Touch probe 1 no positive edge value stored
	1		Touch probe 1 positive edge position stored
2	0		Touch probe 1 no negative edge value stored
	1		Touch probe 1 negative edge position stored
3 to 7	-		Reserved
8	0	2	Touch probe 2 is disabled
	1		Touch probe 2 is enabled
9	0		Touch probe 2 no positive edge value stored
	1		Touch probe 2 positive edge position stored
10	0		Touch probe 2 no negative edge value stored
	1		Touch probe 2 negative edge position stored
11 to 15	-		Reserved

Next toggle DIN 1 positive and then negative and then DIN2 positive.

Values appear in TP 1 Positive and Negative Values and in TP2 Positive Value.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	4915	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	775	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	546301	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	546301	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	546301	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

The touch probe status changes to 775 (decimal) which is 2#0011 0000 0111.

60B9h, 68B9h Touch probe status - Axis

The status of the two touch probes associated with an axis. The EtherCAT or CANopen master can use this value to check if 60B9h to 60BDh contain values. If a touch probe is disabled, bit 0, then the latched bits, bits 1 and 2, are always 0.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0		Touch probe is disabled
	1		Touch probe is enabled
1	0		Touch probe 1 no positive edge value stored
	1	1	Touch probe 1 positive edge position stored
2	0		Touch probe 1 no negative edge value stored
	1		Touch probe 1 negative edge position stored
3 to 7	-		Reserved
8	0		Touch probe 2 is disabled
	1		Touch probe 2 is enabled
9	0		Touch probe 2 no positive edge value stored
	1	2	Touch probe 2 positive edge position stored
10	0		Touch probe 2 no negative edge value stored
	1		Touch probe 2 negative edge position stored
11 to 15	-		Reserved

DIN1 and DIN2 can be toggled as many times as desired since both Touch probe 1 and Touch probe 2 are setup for trigger continuous in the Touch probe function-Axis 1.

Setting the Touch Probe Function to 0 resets the Touch Probe Status to zero as well.

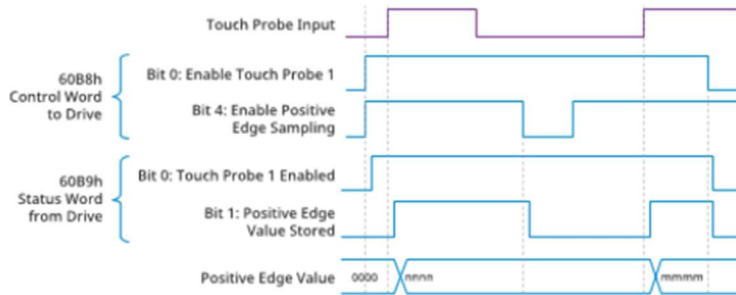
ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Outputs	
Touch probe status - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_1	
Touch probe 1 positive edge - Axis 1	587870	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 1 negative edge - Axis 1	587871	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_2	
Touch probe 2 positive edge - Axis 1	587871	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual Axis FS1).Inputs_3	

Example 3: Demonstrate changing the trigger for touch probe 1 to event instead of continuous.

The primary change in the Touch Probe Function is changing Bit 1 from a 1 (continuous) to 0 (trigger first event).

Note this example is the same case as the timing diagram shown in the AKD2G EtherCAT manual.

The following diagram shows the sequence for controlling the touch probe feature.



60B8h, 68B8h Touch probe function - Axis

Controls the function of the two touch probes associated with an axis.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0		Disable touch probe 1
	1		Enable touch probe 1
1	0		Trigger first event
	1		Trigger continuous
3, 2	00b	1	Trigger with touch probe 1 input (DIN1)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 01h
	11b		Reserved
4	0		Disable sampling at positive edge of touch probe 1
	1		Enable sampling at positive edge of touch probe 1
5	0		Disable sampling at negative edge of touch probe 1
	1		Enable sampling at negative edge of touch probe 1
6, 7			Reserved
8	0		Disable touch probe 2
	1		Enable touch probe 2
9	0		Trigger first event
	1		Trigger continuous
11, 10	00b	2	Trigger with touch probe 2 input (DIN2)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 02h
	11b		Reserved
12	0		Disable sampling at positive edge of the touch probe 2
	1		Enable sampling at positive edge of the touch probe 2
13	0		Disable sampling at negative edge of the touch probe 2
	1		Enable sampling at negative edge of the touch probe 2
14, 15			Reserved

The Touch probe function-Axis 1 will then be set to 2#10001 is 17 (decimal).

Beginning with the Touch Probe Function-Axis 1 equal to 0 (Touchprobes disabled).

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe status - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	

2#10001 is 17 (decimal). Set the Touch Probe Function-Axis 1 to 17.

The touch probe status changes from zero to 1 indicating the touch probe is enabled.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe status - Axis 1	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	

On trigger of DIN1 the status changes to 3 and even if DIN1 toggles on and off a new positive value is not captured.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe status - Axis 1	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 positive edge - Axis 1	587871	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	

In order to reset for a first (new) event (one-shot) toggle Bit 4 (Enable sampling at positive edge of touch probe 1) from 1->0 to disarm the trigger.

2#00001 or 1 (decimal).

The touch probe status indicates 1 (Touchprobe enabled but no touch probe 1 positive edge value stored).

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe status - Axis 1	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 positive edge - Axis 1	587871	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:	

To take a new capture (rearm) toggle bit 4 of the Touch probe function-Axis 1 from 0->1 (rising edge).

The Touch probe function value transitions from 2#00001 (1) to 2#10001 (17)

The touch probe status shows it is rearmed (1).

ADS Symbol Watch			
Symbol	Value	Type	Path
Touch probe function - Axis 1	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe status - Axis 1	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 1 positive edge - Axis 1	587871	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:

On rising edge of DIN 1 the Touch probe status-Axis 1 changes to 1 to 3 (touchprobe 1 is enabled and new positive edge position store on touchprobe 1) and a new positive edge is captured.

ADS Symbol Watch			
Symbol	Value	Type	Path
Touch probe function - Axis 1	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe status - Axis 1	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 1 positive edge - Axis 1	618831	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A:

As before toggling DIN1 off and on does not result in a new capture. Disarm and Arm the capture in this mode by toggling bit 4 in the Touch Probe Function-Axis 1 object.

Example #4: Demonstrate using the Touch Probe Source instead of using DIN1 or DIN2 in the Touch Probe Function. In all the previous examples we used either DIN1 or DIN2. Example#1 used Touch Probe 1 to continuously sample on the positive edge of DIN1. Let's change the source for DIN3.

The difference in setting up the Touch Probe Function is bits 3,2 and instead of 00b (Trigger with touch probe 1 input(DIN1)) bits 3,2 are set to 10b (Trigger defined in object 60D0h sub-index 01h).

60B8h, 68B8h Touch probe function - Axis

Controls the function of the two touch probes associated with an axis.

See [Touch Probes](#).

Bit	Value	Touch Probe	Description
0	0		Disable touch probe 1
	1		Enable touch probe 1
1	0		Trigger first event
	1		Trigger continuous
3, 2	00b		Trigger with touch probe 1 input (DIN1)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 01h
	11b		Reserved
4	0		Disable sampling at positive edge of touch probe 1
	1		Enable sampling at positive edge of touch probe 1
5	0		Disable sampling at negative edge of touch probe 1
	1		Enable sampling at negative edge of touch probe 1
6, 7	-		Reserved
0	0		Disable touch probe 2
	1		Enable touch probe 2
9	0		Trigger first event
	1		Trigger continuous
11, 10	00b	2	Trigger with touch probe 2 input (DIN2)
	01b		Trigger on zero pulse from feedback
	10b		Trigger defined in object 60D0h sub-index 02h
	11b		Reserved
12	0		Disable sampling at positive edge of the touch probe 2
	1		Enable sampling at positive edge of the touch probe 2
13	0		Disable sampling at negative edge of the touch probe 2
	1		Enable sampling at negative edge of the touch probe 2
14, 15	-		Reserved

The Touch probe function-Axis 1 will then be set to 2#11011 or 27 (decimal).

To set DIN3 as a touch probe source X22 must be fitted (which is true in this demonstration).

60D0h must be set to -3 for DIN3. Note negative values are manufacturer specific.

60D0h, 68D0h Touch probe source - Axis

Selects which AKD2G input is used to trigger the touch probe and capture new data.

See [Touch Probes](#).

AKD2G Values for 60D0h	AKD2G Note
-41 to -42	Z pulse for Axis 1 to 2
-31 to -35	Z pulse for Feedback 1 to 5 As FB1, 2, 4, and 5 do not support Z pulses then these will not be shown. When we support SFA on FB 1 and 2 then Z pulse may be possible. X23 is optional so if not fitted then -33 will not be valid.
-21 to -28	DIO1 to DIO8 When X22 is not fitted options -21 and -22 will not be valid. When X23 is not fitted options -23 to -28 will not be valid.
-1 to -12	DIN1 to DIN12 When X22 is not fitted options -9 to -12 will not be valid.
0	Reserved
1	DIN1, Fast Opto
2	DIN2, Fast Opto
3-4	Reserved
5	Valid if AXIS#.PLFBSOURCE is using a feedback that supports a Z pulse.
6 to 32767	Reserved

Since 60D0 isn't on the Fixed PDO list it was set via CoE.

60D0:0	Touch probe source - Axis 1		> 2 <
60D0:01	Touch probe 1 source - Axis 1	RW	-3
60D0:02	Touch probe 2 source - Axis 1	RW	2

Start with the Touch probe function-Axis 1 set to 0.

ADS Symbol Watch				
Symbol	Value	Type	Path	
Touch probe function - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe status - Axis 1	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 1 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 1 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 2 positive edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	
Touch probe 2 negative edge - Axis 1	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A	

Next set the Touch Probe Function as predetermined (27 (decimal)). The touch probe status changes to 1 to indicate enabled (armed).

TwinCAT Project23 Solution Explorer ADS Symbol Watch			
Symbol	Value	Type	
Touch probe function - Axis 1	27	UINT	
Touch probe status - Axis 1	1	UINT	
Touch probe 1 position positive value - Axis 1	0	DINT	
Touch probe 1 position negative value - Axis 1	0	DINT	
Touch probe 2 position positive value - Axis 1	0	DINT	
Touch probe 2 position negative value - Axis 1	0	DINT	

On rising edge of DIN3 the touch probe status changes to 3 and a positive value is captured in Touch Probe 1 Position Positive Value-Axis 1.

ADS Symbol Watch			
Symbol	Value	Type	Path
Touch probe function - Axis 1	27	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A
Touch probe status - Axis 1	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A
Touch probe 1 positive edge - Ax	700000	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A
Touch probe 1 negative edge - A	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A
Touch probe 2 positive edge - Ax	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A
Touch probe 2 negative edge - A	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD2G Dual A

Since this is setup for a continuous trigger, DIN3 can be toggled on and off as many times as desired to capture new positions.