# AKD1G Touch Probes Rev B. 8/20/24

## **Touch Probe Overview**

The touch probe feature of EtherCAT is simply a position capture from a trigger source (typically a digital input to the drive but could also be from the feedback device such as a Z/marker pulse). The EtherCAT touch probes, in fact, uses the position capture engines in the AKD.

There are two touchprobes (Touch Probe 1 and Touch Probe 2) available corresponding to CAPO and CAP1 in the AKD.

Each touch probe is configurable to use positive edge, negative edge, or both and to be armed (triggered) continuously or on first event (one-shot). There is a touch probe function (control) word that configures both Touch Probe 1 and Touch Probe 2.

There is a status word which includes the status bit information for both Touch Probe 1 and Touch Probe 2 for monitoring if the Touch Probe is switch off or enable and if a positive or negative edge value is stored or not.

There is an object that provides the ability to define the sources (trigger) for Touch Probe 1 and 2.

Touch Probe support from the AKD EtherCAT manual is as follows:

#### 5.3.82 Object 60B8h: Touch probe function

This object indicates the configured function of the touch probe.

-	
Index	60B8h
Name	Touch probe function
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/W
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

Definition of the possible functions:

Bit	Value	Meaning
0	0	Switch off touch probe 1
	1	Enable touch probe 1
1	0	Trigger first event
	1	Continuous
3, 2	00b*	Trigger with touch probe 1 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 01h
	11b	reserved
4	0	Switch off sampling at positive edge of touch probe 1
	1	Enable sampling at positive edge of touch probe 1
5	0	Switch off sampling at negative edge of touch probe 1
	1	Enable sampling at negative edge of touch probe 1
6,7		User-defined (e.g. for testing)
8	0	Switch off touch probe 2
	1	Enable touch probe 2
9	0	Trigger first event
	1	continuous
11, 10	00b	Trigger with touch probe 2 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 02h
	11b	reserved
12	0	Switch off sampling at positive edge of touch probe 2
	1	Enable sampling at positive edge of touch probe 2
13	0	Switch off sampling at negative edge of touch probe 2
	1	Enable sampling at negative edge of touch probe 2
14, 15		User-defined (e.g. for testing)

• b = binary

If both edges are selected at the same time (bit 4=1 and bit 5=1 for probe 1 or bit 12=1 and bit 13=1 for probe 2), the first edge (positive or negative) triggers the probe function. The position, latched at this edge, is taken over for both edges (positive and negative).

#### 5.3.92 Object 60D0h: Touch probe source

Index	60D0h
Name	Touch probe source
Object code	Array
Data type	Integer 16
Category	optional
Subindex	0
Description	Highest sub-index supported
Category	mandatory
Access	R/O
PDO mapping	not possible
Value range	2
Default value	2
Subindex	1
Description	Touch probe 1 source
Category	mandatory
Access	R/W
PDO mapping	not possible
Value range	-11 to -1, 1 to 5
Default value	1
Subindex	2
Description	Touch probe 2 source
Category	mandatory
Access	R/W
PDO mapping	not possible
Value range	-11 to -1, 1 to 5
Default value	1
alue description:	
No.	

This object provides the source of the touch probe function, when the dedicated bits 2/3 or 10/11 of the touch probe function (object 6088h) are set accordingly.

Value	Description	Value	Description
1	Touch Probe 1 Input	3	Touch Probe 3 Input
2	Touch Probe 2 Input	4	Touch Probe4 Input
-1 to -11	AKD Input related to CAPx.TRIGGER 0 to 10		

## 5.3.83 Object 60B9h: Touch probe status

This object indicates the status of the touch probe.

Index	60B9h
Name	Touch probe status
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

Definition of the status:

Bit	Value	Meaning
0	0	Touch probe 1 is switched off
	1	Touch probe 1 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 5	0	reserved
6,7		User-defined (e.g. for testing)
8	0	Touch probe 2 is switched off
	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 probe2 negative edge position stored
11 to 13	0	reserved
14, 15	-	User-defined (e.g. for testing)

#### 5.3.84 Object 60BAh: Touch probe 1 positive edge

This object provides the position value of the touch probe 1 at positive edge.

Index	EORAN
Index	OUDAN
Name	Touch probe 1 positive edge
Object code	Variable
Data type	INTEGER32
Category	optional
Access	R/O
PDO Mapping	yes
Value range	INTEGER32
Default value	no

## 5.3.85 Object 60BBh: Touch probe 1 negative edge

This object provides the position value of the touch probe 1 at negative edge.

Index	60BBh
Name	Touch probe 1 negative edge
Object code	Variable
Data type	INTEGER32
Category	optional
Access	R/O
PDO Mapping	yes
Value range	INTEGER32
Default value	no

#### 5.3.86 Object 60BCh: Touch probe 2 positive edge

This object provides the position value of the touch probe 2 at positive edge.

Index	60BCh
Name	Touch probe 2 positive edge
Object code	Variable
Data type	INTEGER32
Category	optional
Access	R/O
PDO Mapping	yes
Value range	INTEGER32
Default value	no

#### 5.3.87 Object 60BDh: Touch probe 2 negative edge

This object provides the position value of the touch probe 2 at negative edge.

Index	60BDh
Name	Touch probe 2 negative edge
Object code	Variable
Data type	INTEGER32
Category	optional
Access	R/O
PDO Mapping	yes
Value range	INTEGER32
Default value	no

## 5.3.92 Object 60D0h: Touch probe source

Index		60D0h			
Name		Touch probe source			
Object co	de	Array			
Data type	)	Integer 16			
Category		optional			
Subindex		0			
Descripti	on	Highest sub-index supported			
Category		mandatory			
Access		R/O			
PDO map	ping	not possible			
Value ran	ge	2			
Default v	alue	2			
Subindex	8	1			
Descripti	on	Touch probe 1 source			
Category		mandatory			
Access		R/W			
PDO map	ping	not possible			
Value ran	ge	-11 to -1, 1 to 5			
Default v	alue	1			
Subindex		2			
Descripti	on	Touch probe 2 source			
Category		mandatory			
Access		R/W			
PDO map	ping	not possible			
Value range		-11 to -1, 1 to 5			
Default value		1			
alue des	cription:	-			
Value	Descripti	on	Value	Description	
1	Touch Pr	obe 1 Input	3	Touch Probe 3 Input	
2	Touch Pr	obe 2 Input	4	Touch Probe4 Input	

-1 to -11 AKD Input related to CAPx.TRIGGER 0 to 10

This object provides the source of the touch probe function, when the dedicated bits 2/3 or 10/11 of the touch probe function (object 6088h) are set accordingly.

In section 4.7 of the AKD EtherCAT manual there are lists of supported Cyclic Setpoint and Actual Values. Related to Touch Probes:

# 4.7 Supported Cyclical Setpoint and Actual Values

Supported cyclical setpoint values

Name	CANopen object	Data type	Description	
Touch probe function	0,600.9	16.68		

## Supported cyclical actual values

Name	CANopen object	Data type	Description
Touch probe status	0x60B9 sub 0	16 bit	
Touch probe 1 positive edge pos	0x60BA sub 0	32 bit	
Touch probe 1 negative edge pos	0x60BB sub 0	32 bit	
Touch probe 2 positive edge pos	0x60BC sub 0	32 bit	
Touch probe 2 negative edge pos	0x60BD sub 0	32 bit	

From Appendix 5 CANopen object tables:

Index	Sub- index	Data Type	Float Scale	Access	PDO map.	Description	ASCII object
60B8h	0	U16		RW	yes	Touch probe func- tion	-
60B9h	0	U16		RW	yes	Touch probe status	—
60BAh	0	INT32		RW	yes	Touch probe 1 pos- itive edge	_
60BBh	0	INT32		RW	yes	Touch probe 1 neg- ative edge	_
60BCh	0	INT32		RW	yes	Touch probe 2 pos- itive edge	-
60BDh	0	INT32		RW	yes	Touch probe 2 neg- ative edge	-
						_	_
60D0h		Array				Touch probe source	)—

60D0h	0	U8	RO	no	highest sub-index	-
60D0h	1	INT16	RW	no	Touch probe 1 source	-
60D0h	2	INT16	RW	no	Touch probe 2 source	—

There are no Predefined Fixed PDOs for Touch Probes in the AKD1G drive so flexible PDO mapping is ultilized.



# Summary of Input PDOs used in this test

# <u>0x1A00</u>

General	EtherCA	T DC	Process	Data Plc	Startup	CoE - Online	Online	NC: Online	NC: Functio	ns		
Sync M	anager:			PDO List:								
SM	Size	Туре	Flags	Index	Size	Name			Flags	SM	SU	^
0	512	MbxOut		0x1A00	4.0	Inputs				3	0	
1	512	MbxIn		0x1A01	8.0	Inputs				3	0	
2	8	Outputs		0x1A02	8.0	Inputs				3	0	
3	28	Inputs		0x1A03	8.0	Inputs				3	0	
				0x1B01	6.0	Inputs			F		0	
				0x1B20	32.0	Inputs			F		0	
			>	0x1B21	6.0	Inputs			F		0	
-				A.1000	22.0	laan da			r		0	
PDO As	signment	(0x1C13):		PDO Conten	t (0x1A00	):						
	A00		^	Index	Size	Offs N	ame			Туре	Default (hex)	
	A02			0x6041:00	2.0	0.0 S	tatusword	d l		UINT		
<b>⊘</b> 0x1	A03			0x60B9:00	2.0	2.0 T	ouch pro	be status		UINT		
0x1	B01 (exclu	uded by 0x	(1A03)			4.0						
	B20 (exclu B21 (exclu	uded by 0x uded by 0x	c1A03									
Down	load			Predefined	DO Assi	anment: (none)						~
P	DO Assign	nment					-					
	DO Config	uration		Load PDO II	to trôm đ	evice						
	a a boring			Sync Unit A	ssignment							

# <u>0x1A01</u>

General	EtherCA	T DC	Process	Data Plc	Startup	CoE - Online	Online	NC: Online	NC: Functio	ns		
Sync M	anager:			PDO List:								
SM	Size	Туре	Flags	Index	Size	Name			Flags	SM	SU	^
0	512	MbxOut		0x1A00	4.0	Inputs				3	0	
1	512	MbxIn		0x1A01	8.0	Inputs				3	0	
2	8	Outputs		0x1A02	8.0	Inputs				3	0	
3	28	Inputs		0x1A03	8.0	Inputs				3	0	
				0x1B01	6.0	Inputs			F		0	
				0x1B20	32.0	Inputs			F		0	
<			>	0x1B21	6.0	Inputs			F		0	×
-				0.1000	11.0	laar da					0	
PDO As	ssignment	(0x1C13):		PDO Conte	ent (0x1A01	):						
	A00		^	Index	Size	Offs N	ame			Туре	Default (hex)	
	A02			0x60BA:	00 4.0	0.0 T	ouch pro	be 1 positive	edge	DINT		
<b>⊘</b> 0x1	A03			0x60BB:	00 4.0	4.0 T	ouch pro	be 1 negative	edge	DINT		
0x1	B01 (exclu	ided by 0x	1A03			8.0						
	B20 (exclu B21 (exclu	Ided by Ux	1A03									
I TOXT	DZTIEXCIL	Jueu by ux	TAUS									
Down	load			Predefine	d PDO Assi	gnment: (none)						
P	DO Assign	nment		Load PDC	info from d	evice						
P	DO Config	uration		0 11 7								
				Sync Unit	Assignment							

# <u>0x1A02</u>

General	EtherCA	T DC	Process	Data Plc	Startup	CoE - Onlin	e Online	NC: Online	NC: Funct	tions			
Sync M	anager:			PDO List	:								
SM	Size	Туре	Flags	Index	Size	Name			Flags		SM	SU	^
0	512	MbxOut		0x1A0	4.0	Inputs					3	0	
1	512	MbxIn		0x1A0	1 8.0	Inputs					3	0	
2	8	Outputs		0x1A0	2 8.0	Inputs					3	0	
3	28	Inputs		0x1A0	3 8.0	Inputs					3	0	
				0x1B0	1 6.0	Inputs			F			0	
				0x1B2	32.0	Inputs			F			0	
<			>	0x1B2	1 6.0	Inputs			F			0	~
PDO As	signment	(0x1C13):		PDO Co	ntent (0x1A0)	2):							
	A00 A01		^	Index	Size	Offs	Name			Туре		Default (hex)	
V 0x1/	A02			0x60B	C:00 4.0	0.0	Touch pr	obe 2 positive	edge	DINT			
<b>⊘</b> 0x1/	A03			0x60B	D: 4.0	4.0	Touch pr	obe 2 negativ	e edge	DINT			
	B01 (exclu B20 (exclu B21 (exclu	uded by 0x uded by 0x uded by 0x	(1A03) (1A03) (1A03) ¥			8.0							
Down	load			Predefir	ned PDO Ass	gnment: (nor	e)						$\sim$
PI	DO Assign	nment		Load Pl	OO info from o	levice							
M	DU Config	guration		Sync Ur	nit Assignmen	t							

# <u>0x1A03</u>

General	EtherCA	T DC	Process	Data	Plc	Startup	CoE - Online	Online	NC: Online	NC: Functi	ons			
Sync M	anager:			PDO	List:									
SM	Size	Туре	Flags	Inde	ex	Size	Name			Flags	SM	N	SU	^
0	512	MbxOut		0x1	A00	4.0	Inputs				3		0	
1	512	MbxIn		0x1	A01	8.0	Inputs				3		0	
2	8	Outputs		0x1	A02	8.0	Inputs				3		0	
3	28	Inputs		0x1	A03	8.0	Inputs				3		0	
				0x1	B01	6.0	Inputs			F			0	
				0x1	B20	32.0	Inputs			F			0	
<			>	0×1	B21	6.0	Inputs			F			0	~
PDO As	signment	(0x1C13):		PDO	Content	(0x1A03)							10	
	A00	(	^	Inde	ex	Size	Offs N	ame			Туре		Default (hex)	
	A01 A02			0x6	063:00	4.0	0.0 P	osition ad	ctual internal v	value	DINT			
0x1	A03			0x6	064:00	4.0	4.0 P	osition ad	ctual value		DINT			
0x1 0x1 0x1	B01 (exclu B20 (exclu B21 (exclu	uded by 0x uded by 0x uded by 0x	(1A03) (1A03) (1A03)				8.0							
Down	load			Pred	lefined P	DO Assig	nment: (none)							$\sim$
P	DO Assign	nment		Load	d PDO in	fo from de	evice							
P	DO Config	guration		Sync	: Unit As	signment								

# Summary of Output PDOs used for this test

## <u>0x1600</u>

					Startup	COL	OTIMITE	NC. Of mile	INC. FUNCTION	15		
nc M	anager:			PDO List:								
SM	Size	Туре	Flags	Index	Size	Name			Flags	SM	SU	
)	512	MbxOut		0x1600	6.0	Outputs				2	0	
1	512	MbxIn		0x1601	2.0	Outputs				2	0	
2	8	Outputs		0x1602	0.0	Outputs					0	
3	28	Inputs		0x1603	0.0	Outputs					0	
				0x1701	6.0	Outputs			F		0	
				0x1702	6.0	Outputs			F		0	
				0x1720	14.0	Outputs			F		0	
_				0.1701	0.0	0.1			r		0	
)O As	signment	(0x1C12):		PDO Conten	(0x1600)							
-]0x10	600		^	Index	Size	Offs	Name			Туре	Default (hex)	
10x1	602			0x6040:00	2.0	0.0	Controlwo	rd		UINT		
0x10	603			0x60C1:01	4.0	2.0	1st set-poi	int		DINT		
0x1	701 (excli	uded by 0x	(1601)			6.0						
10x1	720 (excli	uded by 0x	(1601)									
1041		1000 01 04	10017									
Jown	load			Predefined f	PDO Assig	nment: (none	:)					
P	DO Assig	nment		Load PDO in	fo from d	evice						
✓ PI	DO Config	guration		Core Unit A								

# <u>0x1601</u>

er: Ty Mt Ou Inp	Type MbxOut MbxIn Dutputs nputs	Flags	PDO List: Index 0x1600 0x1601 0x1602 0x1603 0x1701 0x1702 0x1702	Size 6.0 2.0 0.0 0.0 6.0	Name Outputs Outputs Outputs Outputs			Flags	SM 2 2	SU 0	
Ty Mt Ou Inp	Type MbxOut MbxIn Dutputs nputs	Flags	Index 0x1600 0x1601 0x1602 0x1603 0x1701 0x1702 0x1702	Size 6.0 2.0 0.0 0.0 6.0	Name Outputs Outputs Outputs Outputs			Flags	SM 2 2	SU 0	
Mt Ou Inp	MbxOut MbxIn Dutputs nputs		0x1600 0x1601 0x1602 0x1603 0x1701 0x1702	6.0 2.0 0.0 0.0 6.0	Outputs Outputs Outputs Outputs				2	0	
Mt Ou Inp	MbxIn Outputs nputs		0x1601 0x1602 0x1603 0x1701 0x1702	2.0 0.0 0.0 6.0	Outputs Outputs Outputs				2	0	
Ou Inp	Outputs nputs		0x1602 0x1603 0x1701 0x1702	0.0 0.0 6.0	Outputs Outputs						
In;	nputs		0x1603 0x1701 0x1702	0.0	Outputs					0	
			0x1701 0x1702	6.0	Orderide					0	
		_	0x1702		Outputs			F		0	
			0 1700	6.0	Outputs			F		0	
		>	0x1/20	14.0	Outputs			F		0	
			0.1701	0.0	A. 4 4-			r		^	
ient (0x	x1C12):		PDO Content	(0x1601)	:						
		^	Index	Size	Offs	Name			Туре	Default (hex)	)
			0x60B8:00	2.0	0.0	Touch prol	be function		UINT		
					2.0						
xcluded	ed by 0x10	601)									
xcludeo	ed by 0x10	601) ¥									
Noidada		0017	0.10.10								
			Predefined H	DO Assig	nment: (none	:)					
	ent		Load PDO in	fo from de	evice						
signme	ient		Sync Linit Ar	eianment	5						
xclu	bu	Ided by 0x1	uded by 0x1601) uded by 0x1601) ♥ nment guration	uded by 0x1601)  Imment Uation Imment Sync Unit As	Interest of the second	uded by 0x1601) ✓ Predefined PDO Assignment: (none Load PDO info from device guration Sync Unit Assignment	uded by 0x1601) ✓ Predefined PDO Assignment: (none) Imment Load PDO info from device Sync Unit Assignment	Interest by 0x1601) ✓ Predefined PDO Assignment: (none) Interest	Inded by 0x1601) ✓ Predefined PDO Assignment: (none) Internet Icoad PDO info from device Sync Unit Assignment	uded by 0x1601)        uded by 0x1601)        Predefined PDO Assignment: (none)       ument     Load PDO info from device       guration     Sync Unit Assignment	uded by (kt 1601)        ided by (kt 1601)        Predefined PDO Assignment: (none)       Load PDO info from device       Sync Unit Assignment

## <u>0x1602</u>

## Not Used

## <u>0x1603</u>

## Not Used

The first setpoint (Output), Statusword (Input), and Position actual internal value Input) are all linked to the NC-Task->Axis 1 per normal as if using the ESI file defaults.

## **Touchprobe Scaling**

Touchprobe Scaling is scaled by either:

Case#1: The default where FBUS.PARAM05 bit 4=0 and the scaling of the PDO value of the captured positive or negative edge touchprobe is defined by FB1.PSCALE (i.e. default of 20) which results in a value that is 2^20 counts per motor rev. This is the same scaling as object 6063 Position actual internal value.

Case#2: DS402 scaling factors are used where FBUS.PARAM05 bit 4=1 and the scaling of the PDO value of the positive or negative edge touchprobe is defined by:

DS402.POSFCFEED or 6092h sub 1

DS402.POSFCSHAFTREV or 6092h sub 2

DS402.POSGEARMOTORREV or 6091 h sub 1

DS402.POSGEARSHAFTREV or 6091h sub 2

I chose DS402 scaling to scale the touch probe values it is necessary to configure FBUS.PARAM05 and set bit 4 to 1.

#### FBUS.PARAM05 Additional Notes

Bit 0 configures the behavior of DS402 state machine in case of fault resets.

Bit 0	1	Fourthe ease only the reservative DS (02) control used bit 7
Dit v	-	Faults can only be reset using DS402 controlword bit 7.
	0	The reset can also be done using Telnet or digital input and the DS402 state machine reflects this condition.
Bit 1	1	The state of the hardware enable does not change the state machine to state Operation enable.
	0	If the state Operation enable or Switched on is active, it falls back to the state Switch on disabled, if the Hardware enable goes to 0.
Bit 2	1	WorkBench/Telnet cannot software enable the drive when CANopen / EtherCAT are operational.
	0	WorkBench/Telnet can software enable the drive. NOTE During commissioning this bit should be set to 1 to avoid influences to DS402 power stage state machine. The fieldbus should not be in
		operation to avoid influence to test functions of WorkBench.
Bit 3	1	DS402 - state machine is not influenced if the software enable is taken away using Telnet.
	0	DS402 - state machine is influenced if the software enable is taken away using Telnet.
Bit 4	1	Scaling is done using special DS402 - objects (independent on units)
	0	Scaling for position, velocity and acceleration objects is done using UNIT parameters.
land the second s		

FBUS.PARAM05=16.



In this application note Axis 1 was setup accordingly:

In order to scale the positional values over EtherCAT for 1000=1 mm (or 5000=5mm),

the following scaling was used for this application note:

DS402.POSFCFEED= 5000

DS402.POSFCSHAFTREV=1

DS402.POSGEARMOTORREV=1

DS402.POSGEARSHAFTREV=1

The NC-Task->Axis 1 was set for mm.

Solution Explorer	<b>-</b> ₽ ×	New 1G Touchpro	be Test → ×			i i
○ ○  ☵ -   ఀ౷ - @   봗 ━		General Setting	s Parameter	Dynamics Onl	ine Functions (	Coupling Compensation
Search Solution Explorer (Ctrl+;)  Solution 'New 1G Touchprobe Test' (1 project)  New 1G Touchprobe Test  New 1G Touchprobe Test  New 1G Touchprobe Test  New 1G Touchprobe Test  Note: State State  Note: State State  Tables  Description  State State State State  State St	۰ م ۸	Link To I/O Link To PLC Axis Type: Unit:	CANopen DS402 mm v	Drive 1 (AKI 2/Profile MDP 7 Display (On Position: Velocity:	D) 742 (e.g. EtherCAT ly) um mm/min	CoE Drive) ~
A Axes	-11	Result	M-L-P		A	
▷ ₩, Enc ▷ ₩, Drive to Ctd		mm	mm/s	y:	mm/s2	mm/s3
<ul> <li>P inputs</li> <li>P Cutputs</li> <li>PLC</li> <li>SAFETY</li> <li>C++</li> </ul>		Axis Cycle Tin Divider: Modulo:	ne / Access Divid	der	Cycle Time (ms):	2.000

Under NC Task->Axes->Axis 1->Enc->Parameter tab the scaling factor numerator was set to 1.0 mm and the denominator was set to 1000.

Solution Explorer	▼ ₽ × New	1G Touchprobe Test 🗢 🗙				
○ ○ ☆ ☆ - 'o - @ ≯ -	Ge	eneral NC-Encoder Parameter Time Compensation Online				
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Solution 'New 1G Touchprobe Test' (1 project)	<b>^</b>	Parameter	Offline Value	Online Value	L.	Unit
<ul> <li>New 1G Touchprobe Test</li> </ul>		- Encoder Evaluation:				
SYSTEM		Invert Encoder Counting Direction	FALSE	FALSE	B	
A MOIION		Scaling Factor Numerator	1.0	1.0	F	mm/INC
NC-Task 1 SVB		Scaling Factor Denominator (default: 1.0)	1000.0	1000.0	F	
1 Image		Position Bias	0.0	0.0	F	mm
Tables		Modulo Factor (e.g. 360.0°)	360.0	360.0	F	mm
Objects		Tolerance Window for Modulo Start	0.0	0.0	F	mm
A mar Axes		Encoder Mask (maximum encoder value)	0xFFFFFFF	0xFFFFFFFF	D	
A Axis 1		Encoder Sub Mask (absolute range maximum value)	0x000FFFFF	0x000FFFFF	D	
b # Drive		Reference System	'INCREMENTAL'	▼ 'INCREMENTAL'	E	
ta Ctrl		- Limit Switches:				
Inputs		Soft Position Limit Minimum Monitoring	FALSE	FALSE	В	
Outputs		Minimum Position	0.0	0.0	F	mm
PLC SAFETY		Soft Position Limit Maximum Monitoring	FALSE	▼ FALSE	В	
G C++		Maximum Position	0.0	0.0	F	mm
VISION		+ Filter		-		
ANALYTICS		+ Homing:				
▲ 🔀 I/O		+ Other Settings:				
▲ <sup>ec</sup> <sub>la</sub> Devices		· oure searings				
Bence (concerca)     mage     mage     Synclinits     Dence (page)     Inputs     Guputs     Guputs						

Note this is not a requirement for the Touchprobes but it conveniently scales the position units in TwinCAT3 to match the DS402 scaling.

# Example 1: Use Touchprobe 1 to continously sample on the positive edge of DIN1

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#### 5.3.82 Object 60B8h: Touch probe function

This object indicates the configured function of the touch probe.

Index	60B8h		
Name	Touch probe function		
Object code	Variable		
Data type	UNSIGNED16		
Category	optional		
Access	R/W		
PDO Mapping	yes		
Value range	UNSIGNED16		
Default value	0		

ennuor	i or une	possible fulletions.
Bit	Value	Meaning
0	0	Switch off touch probe 1
	1	Enable touch probe 1
1	0	Trigger first event
	1	Continuous
3, 2	00p.	Trigger with touch probe 1 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 01h
	11b	reserved
4	0	Switch off sampling at positive edge of touch probe 1
l l	1	Enable sampling at positive edge of touch probe 1
5	0	Switch off sampling at negative edge of touch probe 1
	1	Enable sampling at negative edge of touch probe 1
6,7	-	User-defined (e.g. for testing)
8	0	Switch off touch probe 2
	1	Enable touch probe 2
9	0	Trigger first event
	1	continuous
11, 10	00b	Trigger with touch probe 2 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 02h
	11b	reserved
12	0	Switch off sampling at positive edge of touch probe 2
	1	Enable sampling at positive edge of touch probe 2
13	0	Switch off sampling at negative edge of touch probe 2
	1	Enable sampling at negative edge of touch probe 2
14, 15		User-defined (e.g. for testing)

\* b = binary

If both edges are selected at the same time (bit 4=1 and bit 5=1 for probe 1 or bit 12=1 and bit 13=1 for probe 2), the first edge (positive or negative) triggers the probe function. The position, latched at this edge, is taken over for both edges (positive and negative).

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In this example the touch probe function is to be set to 2#10011 (19 dec).

The touchprobe function is 0 at first (viewed in the ADS Symbol Watch in TwinCAT3).

Symbol	Value	Туре	Path
ouch probe function	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
ouch probe status	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
ouch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
ouch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
ouch probe 2 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
ouch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
osition actual internal value	1318667	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
osition actual value	6288	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3

Next to enable Touch Probe 1 (and arm) set the Touch Probe Function to 19.

I used Online Force for this purpose.

Solution Explorer	• 4 ×	ADS Symbol W	atch					
○ ○ ☆ ☆ · ○ · ○ / ● —			Symbol		Value			Туре
Search Solution Explorer (Ctrl+;)	ρ-	Touch pro	e function	0			UINT	
		Touch pro	oe status	0			UINT	
WISION	_	Touch pro	e 1 positive e	dge 0			DINT	
ANALYTICS		Touch pro	e 1 negative e	edge 0			DINT	
▲ 🕎 I/O		Touch prol	e 2 positive e	dge 0			DINT	
▲ 📲 Devices		Touch prol	e 2 negative e	edge 0			DINT	
<ul> <li>Device 2 (EtherCAT)</li> </ul>		Position ad	tual internal v	alue 1318	666		DINT	
🚔 Image		Position a	tual value	6288			DINT	
📑 Image-Info			Set Value Dial	og			×	
P Z SyncUnits		_		-				
Outputs		New 1G Touch	Dec:	19		OK		
InfoData			Hex:	0x0013		Cance	el 📃	
▲ ➡IJ Drive 1 (AKD)		Variable Fla	Float				_	
Inputs	- 11	Value:	rioac.					
🚰 Statusword	- 11	New Value:						
🔁 Touch probe status	- 11	Hen value.	Bool:	0	1	Hex Edi	it	
▲ Unputs_1	- 11	Comment:	Binary:	13 00		2		
Touch probe 1 positive edge	- 11		Di Circu	01.00	a			
	- 11		BIC SIZE:	01.08	● 16 U 32 0	0 64 0 7		
Touch probe 2 positive edge	- 11							
🔁 Touch probe 2 negative edge	- 11							,
Inputs_3	- 11							
😤 Position actual internal value	- 11						0	T
🔁 Position actual value	- 11							-
▲ Outputs	- 11							-
Controlword	- 11							İ.
Outputs 1	- 11							-
F Touch probe function								+
WcState								Į.
InfoData								L

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

ADS Symbol Watch			
Symbol	Value	Туре	Path
Touch probe function	19	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	1318665	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	6288	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3

#### 5.3.83 Object 60B9h: Touch probe status

This object indicates the status of the touch probe.

Index	60B9h		
Name	Touch probe status		
Object code	Variable		
Data type	UNSIGNED16		
Category	optional		
Access	R/O		
PDO Mapping	yes		
Value range	UNSIGNED16		
Default value	0		

#### Definition of the status:

Bit	Value	Meaning				
0	0	Touch probe 1 is switched off				
	1	Touch probe 1 is enabled				
1	0	Touch probe 1 no positive edge value stored				
	1	uch 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 5	0	eserved				
6,7		User-defined (e.g. for testing)				
8	0	Touch probe 2 is switched off				
	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 probe2 negative edge position stored				
11 to 13	0	reserved				
14, 15		User-defined (e.g. for testing)				

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 is shown. The value is the Workbench value of CAP0.PLFB x 1000. Also note the "Position actual value" which is the position feedback is also the same value of the Touch Probe 1 Positive Edge value because both are scaled by the DS402 scaling.

Symbol	Value	Туре	Path
Touch probe function	19	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	6288	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	1318666	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	6288	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3

## From Workbench Watch:

Device		Parameter		Value
no_name (Online)*	~	PL.FB	~	6.288 mr
no_name (Online)*	~	CAP0.PLFB	~	6.288 mr

## A value of 3 in the Touch Probe Status Word is:

#### 5.3.83 Object 60B9h: Touch probe status

This object indicates the status of the touch probe.

Index	60B9h			
Name	Touch probe status			
Object code	Variable			
Data type	UNSIGNED16			
Category	optional			
Access	R/O			
PDO Mapping	yes			
Value range	UNSIGNED16			
Default value	0			
Definition of the state	JS:			
Bit Value Mea	ning			

Bit	Value	Meaning					
0	0	Touch probe 1 is switched off					
	1	Touch probe 1 is enabled					
1	0	Touch probe 1 no positive edge value stored					
	1	fouch probe 1 positive edge position stored					
2	2 0 Touch probe 1 no negative edge value stored						
	1	Touch probe 1 negative edge position stored					
3 to 5	0	0 reserved					
6,7		User-defined (e.g. for testing)					
8	0	Touch probe 2 is switched off					
	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 probe2 negative edge position stored					
11 to 13	0	reserved					
14, 15	-	User-defined (e.g. for testing)					

Since this is a continuous trigger Axis 1 can be moved to change the feedback position and DIN1 and be toggled low and then high again for a new capture (again the Workbench value x 1000).

Symbol	Value	Туре	Path
ouch probe function	19	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
ouch probe status	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
ouch probe 1 positive edge	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
ouch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Fouch probe 2 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
ouch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
osition actual internal value	3057884	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs 3

# From Workbench Watch.

Device		Parameter		Value	
no_name (Online)*	~ PL.	FB	~	14.581	mm
no_name (Online)*	~ CA	P0.PLFB	~	14.581 >	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:

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#### 5.3.82 Object 60B8h: Touch probe function

This obje	ct indic	ates the configured function of the touch probe.					
Index		60B8h					
Name		Touch probe function					
Object c	ode	Variable					
Data typ	e	UNSIGNED16					
Categor	y.	optional					
Access		R/W					
PDO Ma	apping	yes					
Value ra	nge	UNSIGNED16					
Default	value	0					
Definition	of the	possible functions:					
Bit	Value	eaning					
0	0	witch off touch probe 1					
	1	Enable touch probe 1					
1	0	rigger first event					
	1	ontinuous					
3, 2	00b*	Frigger with touch probe 1 input					
	01b	Trigger with zero impulse signal or position encoder					
	10b	Touch probe source as defined in object 60D0h, sub-index 01h					
	11b	reserved					
4	0	Switch off sampling at positive edge of touch probe 1					
	1	Enable sampling at positive edge of touch probe 1					
5	0	Switch off sampling at negative edge of touch probe 1					
	1	Enable sampling at negative edge of touch probe 1					
6,7		User-defined (e.g. for testing)					

14, 15 \* b = binary

8

9

12

13

1

If both edges are selected at the same time (bit 4=1 and bit 5=1 for probe 1 or bit 12=1 and bit 13=1 for probe 2), the first edge (positive or negative) triggers the probe function. The pos-ition, latched at this edge, is taken over for both edges (positive and negative).

01b Trigger with zero impulse signal or position encoder 10b Touch probe source as defined in object 60D0h, sub-index 02h

0 Switch off sampling at positive edge of touch probe 2

1 Enable sampling at positive edge of touch probe 2 Switch off sampling at negative edge of touch probe 2
 Enable sampling at negative edge of touch probe 2

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The Touch Probe Function then will be set to the following:

0 Switch off touch probe 2

1 continuous 11, 10 00b Trigger with touch probe 2 input

11b reserved

Enable touch probe 2 0 Trigger first event

- User-defined (e.g. for testing)

2#1 0011 0011 0011 (4915 dec).

# Start with the Touch Probe Function set to 0.

Symbol	Value	Туре	Path
Touch probe function	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	3057884	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs 3

# Then change the Touch Probe Fuction to 4915 (dec).

The Touch Probe Status changes to 257 (dec).

Symbol	Value	Туре	Path
Touch probe function	4915	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Output
Touch probe status	257	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Fouch probe 2 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual internal value	3057886	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual value	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs

# 257(dec) is 2#1 0000 0001.

#### 5.3.83 Object 60B9h: Touch probe status

This object indicates	the status of the touch probe.
Index	60B9h
Name	Touch probe status
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

.....

Definition of the status:

Bit	Value	Meaning		
0	0	Touch probe 1 is switched off		
	1	Touch probe 1 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 5	0	reserved		
6, 7	•	User-defined (e.g. for testing)		
8	0	Touch probe 2 is switched off		
	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 probe2 negative edge position stored		
11 to 13	0	reserved		
14, 15	-	User-defined (e.g. for testing)		

Next toggle DIN1 positive and then negative and then DIN2 positive.

Touch Probe 1 positive and negative edges are populated with a captured position and Touch Probe 2 Positive Edge as well.

DS Symbol Watch					
Symbol	Value	Туре	Path		
Touch probe function	4915	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs_		
Touch probe status	775	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs		
Touch probe 1 positive edge	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1		
Touch probe 1 negative edge	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1		
Touch probe 2 positive edge	14581	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2		
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2		
Position actual internal value	3057986	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3		
Position actual value	14582	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3		

## From the Watch in Workbench:

	Device		Parameter		Value	
	no_name (Online)*	v	PL.FB	~	14.582	mm
0	no_name (Online)*	~	CAP0.PLFB	~	14.581	mm

Note from above the Touch Probe Status changed to 775 (dec) which is 2#0011 0000 0111.

#### 5.3.83 Object 60B9h: Touch probe status

This object indicates the status of the touch probe.

Index	60B9h
Name	Touch probe status
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

#### Definition of the status:

Bit	Value	Meaning
0	0	Touch probe 1 is switched off
	1	Touch probe 1 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 5	0	reserved
6,7		User-defined (e.g. for testing)
8	0	Touch probe 2 is switched off
	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 probe2 negative edge position stored
11 to 13	0	reserved
14, 15		User-defined (e.g. for testing)

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.

Symbol	Value	Туре	Path
Touch probe function	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	4640577	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs 3

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

## **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). Trigger first event is like a one-shot capture.

5.3.82 Object 6088h: Touch probe function         Index 6088h         Name         Touch probe function         Object code         Value         Data type         Data	AKD EtherCAT   5	Appendix	c			
5.3.82 Object 6088h: Touch probe function This object indicates the configured function of the touch probe.          Index       6088h         Name       Touch probe function         Object code       Variable         Data type       UNSIGNED16         Category       optional         Access       R/W         POD Mapping       yes         Value range       UNSIGNED16         Default value       0         Default value       0         Default value       0         Default value       0         0       0         Switch off touch probe 1         1       Ent type         1       Continuous         3,2       00b <sup>+</sup> 10b       Trigger with 2 con impute signal or position encoder         10b       Troger with 2 con impute signal or position encoder         10b       Touger with 2 con impute signal or position encoder         10b       Touger with 2 con impute signal or position encoder         10b       Touger with 2 con impute signal or position encoder         10b       Touger with 2 con impute signal or position encoder         10b       Touger with 2 con impute signal or position encoder         10b       Touger sampling at negative edge of touch probe 1						
Index       6088h         Name       Touch probe function         Object code       Variable         Data type       UNSIGNED16         Catagory       optional         Access       R/W         PDD Mapping       yes         Value range       UNSIGNED16         Default value       0         Definition of the possible functions:       Bit         PDI       O       Switch off touch probe 1         1       Enable touch probe 1       1         1       Continuous       3.2         3.2       00b <sup>+</sup> Trigger with touch probe 1 input       10b         10b       Trigger with touch probe 1 input       10b         11b       Continuous       3.2         3.2       00b <sup>+</sup> Trigger with touch probe 1 input       10b         11b       Trigger with touch probe 1 object 60D0h, sub-index 01h         11b       reserved       4         4       0       Switch off sampling at positive edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         1       Enable sampli	5.3.82 Object 60B8h: Touch probe function					
Index         608h           Name         Touch probe function           Object code         Variable           Data type         UNSIGNED 16           Category         optional           Access         R/W           PDO Mapping         yes           Value range         UNSIGNED 16           Definition of the possible functions:         Bit           Bit         Value for touch probe 1           1         Enable fouch probe 1           1         Continuous           3.2         00b*           1         Continuous           3.2         00b*           10b         Togger first event           11b         reserved           4         0           5         0           9         Switch off sampling at positive edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           5         0           9         0           9         0           11         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable touch probe 2           1		This obje	ct indic	ates the configured function of the touch probe.		
Name         Touch probe function           Object code         Variable           Data type         UNSIGNED16           Category         optional           Access         R/W           PDO Mapping         yes           Value range         UNSIGNED16           Default value         0           Definition of the possible functions:           Bit         Value Meaning           0         0           Switch off touch probe 1           1         Enable touch probe 1           1         Inager first event           1         Continuous           3,2         00b*           Trigger with zero imputies signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 01h           11b         reserved           4         0           4         0           1         Enable sampling at nositive edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sourch probe 2           1         En		Index		60B8h		
Object code       Variable         Data type       UNSIGNED16         Category       optional         Access       R/W         PDD Mapping       yes         Value range       UNSIGNED16         Default value       0         Definition of the possible functions:       Bit         Value Meaning       0         0       0         1       Enable touch probe 1         1       Enable touch probe 1         1       Continuous         3.2       00b <sup>+</sup> Trigger with zero impulse signal or position encoder         10b       Troger with zero impulse signal or position encoder         10b       Troger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 60D0h, sub-index 01h         11b       reserved         4       0         9       Switch off sampling at positive edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         1       Enable source probe 2         1       Isable source as defined in object 60D0h, sub-index 02h         1       Enable souch probe 2         1       Ena		Name		Touch probe function		
Data type         UNSIGNED 16           Category         optional           Access         R/W           PDO Mapping         yes           Value range         UNSIGNED 16           Definition of the possible functions:         Bit           81t         Value for the possible functions:           81t         Continuous           3.2         ODF           90         O           91         Continuous           10         Tragger functions and final or position encoder           110         reserved           4         O           91         Forder sampling at positive edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch		Object c	ode	Variable		
Category         optional           Access         R/W           PDO Mapping         yes           Value range         UNSIGNED16           Definition of the possible functions:         0           Bit         Value Meaning           0         0         Switch off touch probe 1           1         Enable touch probe 1           1         Enable touch probe 1           1         Enable touch probe 1           1         Continuous           3,2         00b*           Trigger with zero impulse signal or position encoder           10b         Truck probe source as defined in object 60D0h, sub-index 01h           11b         reserved           4         0           0         Switch off sampling at positive edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           1         Enable sourh probe 2           1         Enable touch probe 2           1         Enable touch probe 2 input           1         Trigger with		Data typ	е	UNSIGNED16		
Access         R/W           PDD Mapping         yes           Value range         UNSIGNED16           Default value         0           0         0           Switch off touch probe 1           1         Enable touch probe 1           1         Continuous           3.2         00b?           10b         Trigger with zero impulse signal or position encoder           10b         Toger with zero impulse signal or position encoder           10b         Toger with zero impulse signal or position encoder           10b         Toger with zero impulse signal or position encoder           10b         Toger first event           4         0         Switch off sampling at positive edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           6,7         User-defined (e.g. for testing)           8         0         Switch off sampling at negative edge of touch probe 1           1         Enable touch probe 2           1         1         Enable touch probe 2           9 <t< td=""><td></td><td>Categor</td><td>У</td><td colspan="2" rowspan="2">optional R/W</td></t<>		Categor	У	optional R/W		
PDD Mapping         yes           Value range         UNSIGNED16           Default value         0           Definition of the possible functions:         Bit           8it         Value Moning           0         Switch off boxh probe 1           1         Enable touch probe 1           1         Enable touch probe 1           1         Continuous           3,2         00b* Trigger with touch probe 1 input           01b         Trigger with zero impulse signal or position encoder           11b         Tooth probe source as defined in object 6000h, sub-index 01h           11b         reserved           4         0         Switch off sampling at positive edge of touch probe 1           5         0         Switch off sampling at negative edge of touch probe 1           6,7         User-defined (e.g. for testing)           8         0         Switch off touch probe 2           1         Enable sampling at positive edge of touch probe 1           6,7         User-defined (e.g. for testing)           8         0         Switch off sampling at negative edge of touch probe 1           1         Enable touch probe 2         1           1         Enable touch probe 2           1         En		Access				
Value range         UNSIGNED16           Definition of the possible functions:         0           Bit         Value         Meaning           0         0         Switch off souch probe 1           1         Enable touch probe 1           1         Enable touch probe 1           1         Continuous           3,2         00b*         Trigger with touch probe 1 input           01b         Trigger with touch probe source as defined in object 60D0h, sub-index 01h           11b         reserved         1           4         0         Switch off sampling at positive edge of touch probe 1           5         0         Switch off sampling at negative edge of touch probe 1           1         Enable sampling at negative edge of touch probe 1           6,7         -         User-defined (e.g. for testing)           8         0         Switch off touch probe 2           9         0         Trigger with touch probe 2 input           11,10         00b         Trigger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 02h           11,10         00b         Trigger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 6		PDO Mapping Value range		yes		
Default value         0           Definition of the possible functions:           Bit         Value Meaning           0         0         Switch off touch probe 1           1         Enable touch probe 1           1         Enable touch probe 1           1         Continuous           3.2         00bt         Trigger with zero impulse signal or position encoder           10b         Trogger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 01h           11b         reserved         4           4         0         Switch off sampling at positive edge of touch probe 1           5         0         Switch off sampling at negative edge of touch probe 1           6.7         User-defined (e.g. for testing)           8         0         Switch off touch probe 2           1         Enable sampling at negative edge of touch probe 1           1         Enable touch probe 2           9         0         Trigger list event           1         Continuous           11,10         Obb         Trigger list event           10b         Touch probe source as defined in object 60D0h, sub-index 02h           11b         reserved <td< td=""><td></td><td>UNSIGNED16</td></td<>				UNSIGNED16		
Definition of the possible functions :         Bit       Value Meaning         0       0       Switch off touch probe 1         1       Enable touch probe 1         1       Enable touch probe 1         1       Continuous         3,2       00b*       Trigger with touch probe 1 input         01b       Tronger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 6000h, sub-index 01h         11b       reserved         4       0       Switch off sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         1       Enable sampling at positive edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         1       Enable touch probe 2       1         1       continuous       11, 10         11, 10       Ob       Trigger with zero impulse signal or position encoder         10b       Trouger with zero impulse signal or position encoder         10b       Trouger with zer		Default	value	0		
Bit         Value         Meaning           0         0         Switch off touch probe 1           1         Enable touch probe 1           1         Enable touch probe 1           1         Continuous           3,2         00b*           1         Continuous           3,2         00b*           1         Continuous           01b         Trugger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 01h           11b         reserved           4         0         Switch off sampling at positive edge of touch probe 1           5         0         Switch off sampling at negative edge of touch probe 1           6         1         Enable sampling at positive edge of touch probe 1           6         1         Enable sampling at negative edge of touch probe 1           6         5         Switch off sampling at negative edge of touch probe 1           6         7         User-defined (e.g. for testing)           8         0         Switch off touch probe 2           1         Enable touch probe 2         1           1         continuous         1           11, 10         00b         Trigge		Definition	of the	possible functions:		
0       0       Switch off touch probe 1         1       1       Enable touch probe 1         1       0       Trigger first event         2       00b*       Trigger with touch probe 1 input         01b       Trigger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 60D0h, sub-index 01h         11b       reserved         4       0       Switch off sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         1       Enable source as defined in object 60D0h, sub-index 02h         7       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         9       0       Trigger first event         1       1       continuous         11,10       0D       Trigger with zero impulse signal or position encoder         10b       Trigger with zero impulse signal or position encoder         10b       Trigger with couch probe 2 input         111,10       0D       Trigger wit		Bit	Value	Meaning		
1         Enable fouch probe 1           1         0         Trigger first event           1         Continuous		0	0	Switch off touch probe 1		
1       0       Trigger first event         3.2       00b*       Trigger with bouch probe 1 input         01b       Trigger with bouch probe 1 input         01b       Trigger with couch probe 1 in object 60D0h, sub-index 01h         11b       Trigger with approximate a set defined in object 60D0h, sub-index 01h         11b       Triserved         4       0       Switch off sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off such probe 2         9       0       Trigger with touch probe 2 input         11,10       00b       Trigger with touch probe 2 input         11       treace a defined in objec			1	Enable touch probe 1		
1       Continuous         3,2       00b*       Trigger with touch probe 1 input         01b       Trigger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 60D0h, sub-index 01h         11b       reserved         4       0       Switch off sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         1       Enable sampling at negative edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         1       Enable sampling at nositive edge of touch probe 1         1       Enable touch probe 2         9       0       Trigger first event         11,10       0D       Trigger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 60D0h, sub-index 02h         11       Trigger with couch probe 2 input.         11b       reserved         12       0       Switch off sampling at positive edge of touch probe 2         13       0       Switch off sampling at		1 0 Tri		Trigger first event		
3.2       00b*       Trigger with touch probe 1 input         01b       Trigger with 2ero impute signal or position encoder         10b       Touch probe source as defined in object 6000h, sub-index 01h         11b       reserved         4       0       Switch off sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         6.7       1       Enable sampling at negative edge of touch probe 1         6.7       1       Enable sampling at negative edge of touch probe 1         8       0       Switch off sourch probe 2         1       Enable touch probe 2         9       0       Trigger first event         10       Trigger with zero impute signal or position encoder         11b       Touch probe source as defined in object 6000h, sub-index 02h         11b       Trigger with zero impute signal or position encoder         10b       Touch probe source as defined in object 6000h, sub-index 02h         11b       Trigger with zero impute signal or position encoder         10b       Touch probe source as defined in object 6000h, sub-index 02h         11b       Teserved         12       0       Switch off sampling at positive edge of touch probe 2         13       0       Switch off sam	1 Co		1	Continuous		
01b       Trigger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 60D0h, sub-index 01h         11b       reserved         4       0       Switch off sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         6       1       Enable sampling at negative edge of touch probe 1         6       0       Switch off sampling at negative edge of touch probe 1         6       1       Enable sampling at negative edge of touch probe 1         6       7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         9       0       Trigger first event         1       Continuous       10b         11,10       00b       Trigger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 6000h, sub-index 02h         11       the sampling at positive edge of touch probe 2         12       0       Switch off sampling at positive edge of touch probe 2         11       Enable sampling at positive edge of touch probe 2         12       0       Switch off sampling at positive edge of touch probe 2         13       0       Switch off sampling at negati		3, 2	00b*	Trigger with touch probe 1 input		
10b       Touch probe source as defined in object 60D0h, sub-index 01h         11b       reserved         4       0         5       0         5       0         6,7       -         1       Enable sampling at negative edge of touch probe 1         6,7       -         1       Enable sampling at negative edge of touch probe 1         6,7       -         1       Enable sampling at negative edge of touch probe 1         6,7       -         1       Enable sampling at negative edge of touch probe 1         6,7       -         1       Enable touch probe 2         9       0       Trigger first event         1       1       Continuous         11,0       0D       Trigger with zero impulse signal or position encoder         10b       Trigger with touch probe 2 input         11,1       0D       Trigger with caro impulse signal or position encoder         11,1       0D       Trigger with caro impulse signal or position encoder         11,1       0D       Trigger with caro impulse signal or position encoder         10b       Trouch probe source as defined in object 60D0h, sub-index 02h         11       Inable sampling at positive edge of touch p			01b	Trigger with zero impulse signal or position encoder		
11b       reserved         4       0       Switch off sampling at positive edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         6.7       1       Enable sampling at negative edge of touch probe 1         8       0       Switch off touch probe 2         1       Enable touch probe 2 input         11.10       Obb         10b       Tragger with zero impulse signal or position encoder         10b       Touch probe source as defined in object 60D0h, sub-index 02h         11b       reserved         12       0         3       0         3       0         4       Enable sampling at negative edge of touch probe 2         13       0         14       Enable sampling at negative edge of touch probe 2         14       1         15       -         16       Isapse sampling at negative edge of touch probe 2		10b To		Touch probe source as defined in object 60D0h, sub-index 01h		
4       0       Switch off sampling at positive edge of touch probe 1         1       Enable sampling at positive edge of touch probe 1         5       0       Switch off sampling at negative edge of touch probe 1         1       Enable sampling at negative edge of touch probe 1         6,7       -       User-defined (e.g. for testing)         8       0       Switch off touch probe 2         1       Enable touch probe 2         9       0       Trigger first event         10       Trigger with touch probe 2 input         11,10       Obb       Trigger with touch probe 2 input         11       Trigger with touch probe 2 input         12       0       Switch off sampling at positive edge of touch probe 2         12       0       Switch off sampling at positive edge of touch probe 2         13       0       Switch off sampling at negative edge of touch probe 2         14       Enable sampling at negative edge of touch probe 2         14       Enable sampling at nega		11b res		reserved		
1         Enable sampling at positive edge of touch probe 1           5         0         Switch off sampling at negative edge of touch probe 1           1         Inable sampling at negative edge of touch probe 1           6,7         -         User-defined (e.g. for testing)           8         0         Switch off touch probe 2           1         Enable sampling at negative edge of touch probe 1           1         Enable touch probe 2           9         0         Trigger first event           1         1         continuous           11,10         0D         Trigger with touch probe 2 input           01b         Trigger with touch probe 2 input           11b         reserved           12         0           13         0           14         Enable sampling at positive edge of touch probe 2           13         0           14         Enable sampling at negative edge of touch probe 2           14         1           15         -           16         sampling at negative edge of touch probe 2           13         0           14         Enable sampling at negative edge of touch probe 2           14         1           15         -		4 0 Sw		Switch off sampling at positive edge of touch probe 1		
5     0     Switch off sampling at negative edge of touch probe 1       1     Enable sampling at negative edge of touch probe 1       6,7     User-defined (e.g. for testing)       8     0     Switch off touch probe 2       1     Enable touch probe 2       9     0     Trigger first event       1     continuous       11,10     00b     Trigger with touch probe 2 input       10b     Trugger with zero impulse signal or position encoder       10b     Touch probe source as defined in object 60D0h, sub-index 02h       11b     reserved       12     0       3     0       3     0       4     Enable sampling at negative edge of touch probe 2       14     Enable sampling at negative edge of touch probe 2       13     0       14     Enable sampling at negative edge of touch probe 2       13     0       14     Enable sampling at negative edge of touch probe 2       14     1       15     -			1	Enable sampling at positive edge of touch probe 1		
1     Enable sampling at negative edge of touch probe 1       6,7     -     User-defined (e.g. for testing)       8     0     Switch off touch probe 2       9     0     Trigger first event       1     I continuous       11, 10     Obb Trigger with touch probe 2 input       10b     Trigger with touch probe 2 input       11, 10     Obb Trigger with touch probe 2 input       11b     Trigger with a gen of the probe 1 in blect 60D0h, sub-index 02h       11b     reserved       12     0       13     0       14     Enable sampling at negative edge of touch probe 2       14     I Enable sampling at negative edge of touch probe 2       14     I user-defined (e.g. for testing)		5	0	Switch off sampling at negative edge of touch probe 1		
6, 7     -     User-defined (e.g. for testing)       8     0     Switch off touch probe 2       1     Enable touch probe 2       9     0     Trigger first event       1     continuous       11,10     00     Trigger with touch probe 2 input       01b     Trigger with touch probe 2 input       11,10     00b     Trigger with touch probe 2 input       11b     Touch probe source as defined in object 60D0h, sub-index 02h       11b     reserved       12     0       3     0       3     0       4     Enable sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       14     Enable sampling at negative edge of touch probe 2       14     5       4     User-defined (e.g. for testing)			1	Enable sampling at negative edge of touch probe 1		
8     0     Switch off touch probe 2       1     Enable touch probe 2       9     0     Trigger first event       1     continuous       11,10     00b     Trigger with zero impulse signal or position encoder       10b     Trigger with zero impulse signal or position encoder       10b     Touch probe source as defined in object 60D0h, sub-index 02h       11b     reserved       2     0       3     0       3     0       4     Enable sampling at negative edge of touch probe 2       11     Enable sampling at negative edge of touch probe 2       13     0       14     Enable sampling at negative edge of touch probe 2       13     0       14     Enable sampling at negative edge of touch probe 2       14     5       4     Lenable sampling at negative edge of touch probe 2		6,7	-	User-defined (e.g. for testing)		
1     Enable touch probe 2       9     0     Trigger first event       1     continuous       11, 10     00b     Trigger with touch probe 2 input       01b     Trigger with zero impulse signal or position encoder       10b     Touch probe source as defined in object 60D0h, sub-index 02h       11b     reserved       12     0     Switch off sampling at positive edge of touch probe 2       13     0     Switch off sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       14, 15     -		8	0	Switch off touch probe 2		
9         0         Trigger first event           1         continuous         1           11,10         00b         Trigger with touch probe 2 input           01b         Trigger with touch probe 2 input           11,10         00b         Trigger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 02h           11b         reserved           12         0         Switch off sampling at positive edge of touch probe 2           13         0         Switch off sampling at negative edge of touch probe 2           14         Enable sampling at negative edge of touch probe 2           14         Enable sampling at negative edge of touch probe 2           14         Finable sampling at negative edge of touch probe 2           14         Lende sampling at negative edge of touch probe 2			1	Enable touch probe 2		
1         continuous           11, 10         00b         Trigger with touch probe 2 input           01b         Trigger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 02h           11b         reserved           12         0           3         0           3         0           4         Enable sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           14         Enable sampling at negative edge of touch probe 2           13         0         Switch off sampling at negative edge of touch probe 2           14         Enable sampling at negative edge of touch probe 2           14         Enable sampling at negative edge of touch probe 2           14, 15         -         User-defined (e.g. for testing)		9	0	Trigger first event		
11, 10     00b     Trigger with touch probe 2 input       01b     Trigger with zero impulse signal or position encoder       10b     Touch probe source as defined in object 60D0h, sub-index 02h       11b     reserved       12     0       Switch off sampling at positive edge of touch probe 2       13     0       Switch off sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       13     0       Switch off sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       1     User-defined (e.g. for testing)			1	continuous		
01b         Trigger with zero impulse signal or position encoder           10b         Touch probe source as defined in object 60D0h, sub-index 02h           11b         reserved           12         0         Switch off sampling at positive edge of touch probe 2           1         Enable sampling at positive edge of touch probe 2           13         0         Switch off sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           14         Is user-defined (e.g. for testing)		11, 10	00b	Trigger with touch probe 2 input		
10b         Touch probe source as defined in object 60D0h, sub-index 02h           11b         reserved           12         0           10b         Switch off sampling at positive edge of touch probe 2           11         Enable sampling at positive edge of touch probe 2           13         0         Switch off sampling at negative edge of touch probe 2           14         Enable sampling at negative edge of touch probe 2           15         -         User-defined (e.g. for testing)			01b	Trigger with zero impulse signal or position encoder		
11b         reserved           12         0         Switch off sampling at positive edge of touch probe 2           1         Enable sampling at positive edge of touch probe 2           13         0         Switch off sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           14, 15         -			10b	Touch probe source as defined in object 60D0h, sub-index 02h		
12     0     Switch off sampling at positive edge of touch probe 2       1     Enable sampling at positive edge of touch probe 2       13     0     Switch off sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       1     Enable sampling at negative edge of touch probe 2       14, 15     -			11b	reserved		
1         Enable sampling at positive edge of touch probe 2           13         0         Switch off sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           14, 15         -         User-defined (e.g. for testing)		12	0	Switch off sampling at positive edge of touch probe 2		
13         0         Switch off sampling at negative edge of touch probe 2           1         Enable sampling at negative edge of touch probe 2           14, 15         -         User-defined (e.g. for testing)			1	Enable sampling at positive edge of touch probe 2		
1         Enable sampling at negative edge of touch probe 2           14, 15         -         User-defined (e.g. for testing)		13	0	Switch off sampling at negative edge of touch probe 2		
14, 15 - User-defined (e.g. for testing)			1	Enable sampling at negative edge of touch probe 2		
		14, 15	-	User-defined (e.g. for testing)		
* b = binary		* b = bina	rv.			

If both edges are selected at the same time (bit 4=1 and bit 5=1 for probe 1 or bit 12=1 and bit 13=1 for probe 2), the first edge (positive or negative) triggers the probe function. The position, latched at this edge, is taken over for both edges (positive and negative).

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# The timing diagram for this example is shown:



The Touch Probe Function will then be set to 2#1 0001 (17 dec).

DS Symbol Watch				
Symbol	Value	Туре	Path	
Touch probe function	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs_	
Touch probe status	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs	
Touch probe 1 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1	
Touch probe 1 negative edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1	
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2	
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2	
Position actual internal value	4640579	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3	
Position actual value	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3	

Beginning with the Touch Probe Function set to 0 (Touch Probes disabled).

## Set the Touch Probe Function to 17.

The Touch Probe Status chagnes from 0 to 1 indicating the Touch Probe is enabled (and armed).

Symbol	Value	Туре	Path
Touch probe function	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs_
Touch probe status	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	4640578	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs 3

## 5.3.83 Object 60B9h: Touch probe status

This object indicates the status of the touch probe.

Index	60B9h
Name	Touch probe status
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

Definition of the status:

Bit	Value	Meaning
0	0	Touch probe 1 is switched off
	1	Touch probe 1 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 5	0	reserved
6,7	1.0	User-defined (e.g. for testing)
8	0	Touch probe 2 is switched off
	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 probe2 negative edge position stored
11 to 13	0	reserved
14, 15		User-defined (e.g. for testing)

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

Symbol	Value	Туре	Path
Touch probe function	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	5635836	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual value	26874	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs

#### 5.3.83 Object 60B9h: Touch probe status

This shi	In at Indiantee	the status	of the touch	arah a
1 115 00	ect indicates	the status (	of the touch	probe.

Index	60B9h	
Name	Touch probe status	
Object code	Variable	
Data type	UNSIGNED16	
Category	optional	
Access	R/O	
PDO Mapping	yes	
Value range	UNSIGNED16	
Default value	0	
Definition of the statu	s:	
Bit Value Mear	ning	
0 0 Touch probe 1 is switched off		

Bit	Value	Meaning
0	0	Touch probe 1 is switched off
	1	Touch probe 1 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 5	0	reserved
6, 7		User-defined (e.g. for testing)
8	0	Touch probe 2 is switched off
	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 probe2 negative edge position stored
11 to 13	0	reserved
14, 15		User-defined (e.g. for testing)

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#0 0001 (1 dec).

#### 5.3.82 Object 60B8h: Touch probe function

This object indicates the configured function of the touch probe.

Index	60B8h
Name	Touch probe function
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/W
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

Definition of the possible functions:

Bit	Value	Meaning
0	0	Switch off touch probe 1
	1	Enable touch probe 1
1	0	Trigger first event
	1	Continuous
3, 2	00b*	Trigger with touch probe 1 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 01h
	11b	reserved
4	0	Switch off sampling at positive edge of touch probe 1
	1	Enable sampling at positive edge of touch probe 1
5	0	Switch off sampling at negative edge of touch probe 1
	1	Enable sampling at negative edge of touch probe 1
6,7		User-defined (e.g. for testing)
8	0	Switch off touch probe 2
	1	Enable touch probe 2
9	0	Trigger first event
	1	continuous
11, 10	00b	Trigger with touch probe 2 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 02h
	11b	reserved
12	0	Switch off sampling at positive edge of touch probe 2
	1	Enable sampling at positive edge of touch probe 2
13	0	Switch off sampling at negative edge of touch probe 2
	1	Enable sampling at negative edge of touch probe 2
14, 15		User-defined (e.g. for testing)

\* b = binary

If both edges are selected at the same time (bit 4=1 and bit 5=1 for probe 1 or bit 12=1 and bit 13=1 for probe 2), the first edge (positive or negative) triggers the probe function. The position, latched at this edge, is taken over for both edges (positive and negative).

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

Symbol	Value	Туре	Path	
Touch probe function	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs	
Touch probe status	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs	
Touch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1	
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1	
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2	
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2	
Position actual internal value	5635837	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3	
Position actual value	26874	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3	

#### 5.3.83 Object 60B9h: Touch probe status

This object indicates the status of the touch probe.

Index	60B9h
Name	Touch probe status
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/O
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

#### Definition of the status:

Bit	Value	Meaning		
0	0	Touch probe 1 is switched off		
	1	Touch probe 1 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 5	0	reserved		
6,7	1.	User-defined (e.g. for testing)		
8	0	Touch probe 2 is switched off		
	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 probe2 negative edge position stored		
11 to 13	0	reserved		
14, 15		User-defined (e.g. for testing)		

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

The Touch Probe Function value transistions from 2# 0 0001 (1) to 2#1 0001 (17).

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## 5.3.82 Object 60B8h: Touch probe function

This object indicates the configured function of the touch probe.

Index	60B8h
Name	Touch probe function
Object code	Variable
Data type	UNSIGNED16
Category	optional
Access	R/W
PDO Mapping	yes
Value range	UNSIGNED16
Default value	0

Definition of the possible functions:

Bit	Value	Meaning		
0	0	Switch off touch probe 1		
	1	Enable touch probe 1		
1	0	Frigger first event		
	1	Continuous		
3, 2	00b*	Trigger with touch probe 1 input		
	01b	Trigger with zero impulse signal or position encoder		
	10b	Touch probe source as defined in object 60D0h, sub-index 01h		
	11b	reserved		
4	0	Switch off sampling at positive edge of touch probe 1		
	1	Enable sampling at positive edge of touch probe 1		
5	0	Switch off sampling at negative edge of touch probe 1		
	1	Enable sampling at negative edge of touch probe 1		
6,7		User-defined (e.g. for testing)		
8	0	Switch off touch probe 2		
	1	Enable touch probe 2		
9	0	Trigger first event		
	1	continuous		
11, 10	00b	Trigger with touch probe 2 input		
	01b	Trigger with zero impulse signal or position encoder		
	10b	Touch probe source as defined in object 60D0h, sub-index 02h		
	11b	reserved		
12	0	Switch off sampling at positive edge of touch probe 2		
	1	Enable sampling at positive edge of touch probe 2		
13	0	Switch off sampling at negative edge of touch probe 2		
	1	Enable sampling at negative edge of touch probe 2		
14, 15		User-defined (e.g. for testing)		

\* b = binary

If both edges are selected at the same time (bit 4=1 and bit 5=1 for probe 1 or bit 12=1 and bit 13=1 for probe 2), the first edge (positive or negative) triggers the probe function. The position, latched at this edge, is taken over for both edges (positive and negative).

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The Touch Probe Status shows it is rearmed (1).

Symbol	Value	Туре	Path
Touch probe function	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	5635838	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	26874	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs 3

On rising edge of DIN 1 the Touch Probe Status changes from 1 to 3 (touch probe 1 is enabled and a new positive edge position is stored ).

A new positive edge position is captured.

Symbol	Value	Туре	Path
Touch probe function	17	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs
Touch probe status	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	31675	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual internal value	7242252	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual value	34534	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs

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 to Arm and Disarm the trigger.

# Example #4: Demonstrate using the Touch Probe Source object to set what trigger is used for the Touch Probe instead of the default DIN1 and DIN2.

Example#1 used Touch Probe 1 to continuously sample on the positive edge of DIN1. Let's change the source to be DIN3.

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

Index		60B8h
Name		Touch probe function
Object	ode	Variable
Data typ	e	UNSIGNED16
Categor	v	optional
Access	,	R/W
PDO Ma	apping	yes
Value ra	nge	UNSIGNED16
Default	value	0
Definition	of the	possible functions:
Dit	Value	Meaning
0	0	Switch off touch probe 1
-	1	Enable touch probe 1
1	0	Trigger first event
-	1	Continuous
3.2	00b*	Trigger with touch probe 1 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 01
	11b	reserved
4	0	Switch off sampling at positive edge of touch probe 1
	1	Enable sampling at positive edge of touch probe 1
5	0	Switch off sampling at negative edge of touch probe 1
	1	Enable sampling at negative edge of touch probe 1
6,7	•	User-defined (e.g. for testing)
8	0	Switch off touch probe 2
	1	Enable touch probe 2
9	0	Trigger first event
	1	continuous
11, 10	00b	Trigger with touch probe 2 input
	01b	Trigger with zero impulse signal or position encoder
	10b	Touch probe source as defined in object 60D0h, sub-index 02
	11b	reserved
12	0	Switch off sampling at positive edge of touch probe 2
	1	Enable sampling at positive edge of touch probe 2
13	0	Switch off sampling at negative edge of touch probe 2
	1	Enable sampling at negative edge of touch probe 2
14 15	-	User-defined (e.g. for testing)

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Later in the procedure the Touch Probe Function will then be set to 2#1 1011 (27 dec).

To set DIN3 as the touch probe source object 60Dh must be set to -3 for DIN3. Note negative values are manufacturer specific.

#### 5.3.92 Object 60D0h: Touch probe source

This object provi 10/11 of the touc	des the source of the touch probe function, when the dedicated bits 2/3 or h probe function (object 60B8h) are set accordingly.
Index	60D0h
Name	Touch probe source
Object code	Array
Data type	Integer 16

Objectice	000	Allay				
Data type	9	Integer 16				
Category		optional				
Subindex		0				
Descripti	on	Highest sub-index supported				
Category	t	mandatory				
Access		R/O				
PDO ma	pping	not possible				
Value ran	ige	2				
Default v	alue	2				
Subindex	(	1				
Descripti	on	Touch probe 1 source				
Category		mandatory				
Access		R/W				
PDO mapping		not possible				
Value range		-11 to -1, 1 to 5				
Default value		1				
Subindex		2				
Description		Touch probe 2 source				
Category		mandatory				
Access		R/W				
PDO mapping		not possible				
Value range		-11 to -1, 1 to 5				
Default value		1				
/alue des	cription:					
Value	Descript	ion	Value	Description		
1	Touch P	robe 1 Input	3	Touch Probe 3 Input		
2	Touch P	robe 2 Input	4	Touch Probe4 Input		
-1 to -11	AKD Inp	ut related to CAPx.TRIGGER 0 to 10				

# CAP0.TRIGGER, CAP1.TRIGGER

## 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	X9 Connector, RS485 Input 1
8	X9 Connector, RS485 Input 2
9	X9 Connector, RS485 Input 3
10	Primary Index
11	Tertiary Index

I elected to set 60D0 via CoE Online where 60D0h sub 1 Touch Probe 1 Source= -3 for DIN3.



# Start with the Touch Probe fuction set to 0.

Symbol	Value	Туре	Path
Touch probe function	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Output
Touch probe status	0	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	31675	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual internal value	7242253	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_
Position actual value	34534	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs

Next set the Touch Probe function as predetermined (27 dec). The Touch Probe Status changes to 1 to indicated enabled (armed).

ADS Symbol Watch				- 4 ×
Symbol	Value	Туре	Path	
Touch probe function	27	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs_	
Touch probe status	1	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs	
Touch probe 1 positive edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1	
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1	
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2	
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2	
Position actual internal value	7242252	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3	
Position actual value	34534	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3	

On rising edge of DIN3 the Touch Probe Status changes to a 3 and a positive edge value is captured in the Touch Probe 1 Positive Edge.

Symbol	Value	Туре	Path
ouch probe function	27	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Outputs_
fouch probe status	3	UINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs
Touch probe 1 positive edge	39797	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 1 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_1
Touch probe 2 positive edge	22128	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Touch probe 2 negative edge	0	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_2
Position actual internal value	8346033	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3
Position actual value	39797	DINT	I/O.Devices.Device 2 (EtherCAT).Drive 1 (AKD).Inputs_3