'Probe function actual position encoder'

Translation of the "Original Dokumentation"

Name: FKT_Messfunktionen_Lageistwertgeber_en

Version:

Version: 2019/45	
Change	**Letter symbol**
• Controller card KW-R27 added	STL

Previous version: 2017/14

Product version:

Product (AMK part no.)	Firmware Version (AMK part no.)
KW-R06 (O835) KW-R07 (O807) KW-R16 (O872) KW-R17 (O873)	AE-R05/R06 V1.05 2010/32 (203194)
KW-R24-R (O954)	AE-R24-R V2.11 2016/46 (206643)
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KW-R26 (O903)	AE-R26 V2.11 2016/46 (206645)
KW-R27 (O957)	AE-R26 V2.12 2018/40 (207284)
iX / iC / iDT5	iX V1.00 2011/21 (203699)
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Errata

Topic	Description
'Probe function actual position encoder with touch probe signal'	Not supported for KW-R24-R

1 Probe function actual position encoder

Supported hardware:	KW-R06 / KW-R16 / KW-R07 / KW-R17 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) /

For applications such as a mark control, high-precision actual-position value measurements are required.

Probe functions store the actual position value in real-time, also in between a SERCOS clock pulse. The output of the probe value and the current actual position value takes place with the next SERCOS clock pulse.

The stored values can subsequently be read out and further processed by a controller. The controller can create a real-time reference to an external touch probe signal.

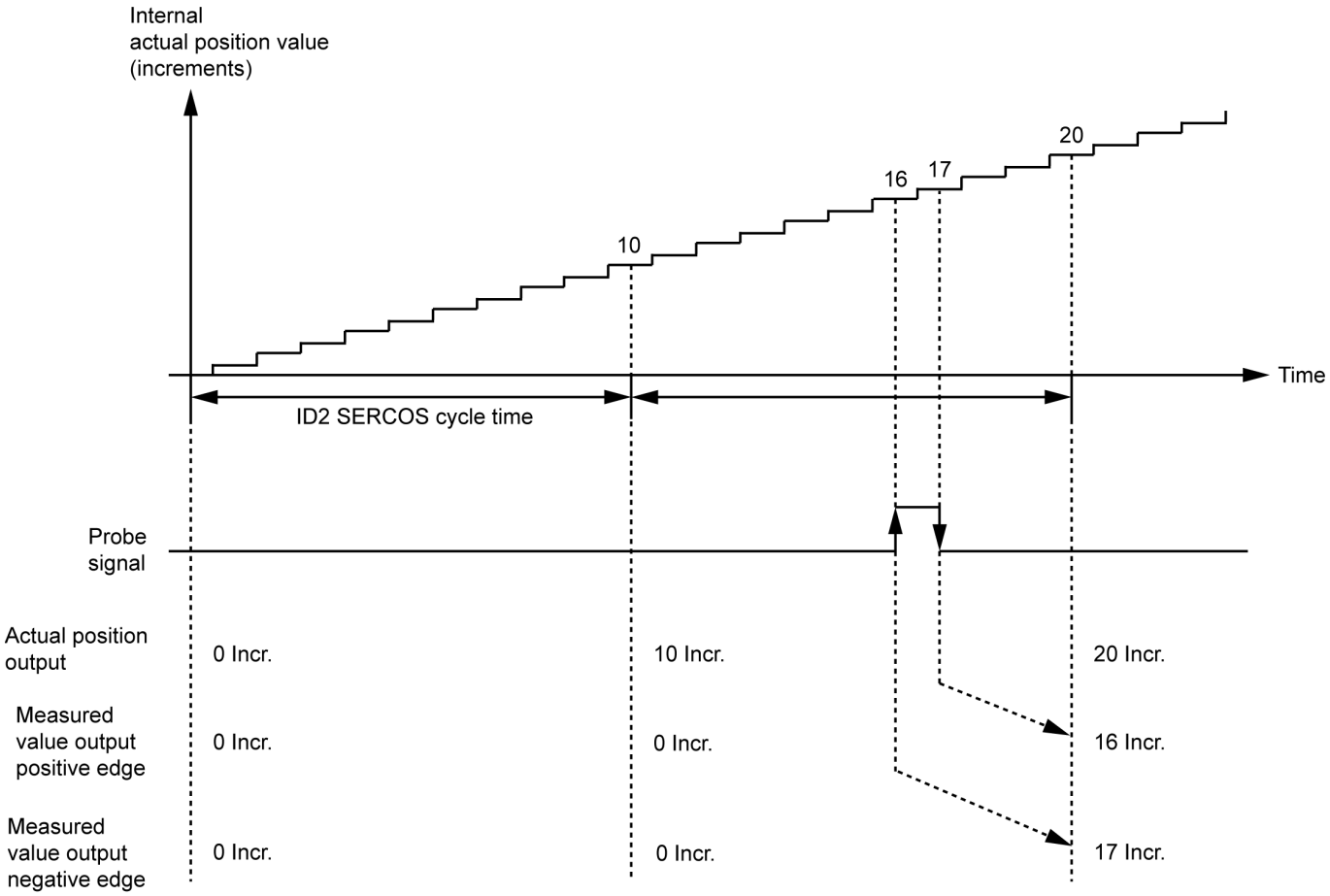
Example mark control

The internal actual position value increases continually per SERCOS clock pulse by 10 increments. The touch probe signal is pending in the second cycle. Depending on the parametrization, the positive or negative touch probe edge is evaluated.

Touch probe value output for negative edge = 17 increments

Touch probe value output for positive edge = 16 increments

The difference (real-time reference) between the actual position value and the touch probe signal is -3 increments for negative edge evaluation and -4 increments for positive edge evaluation.



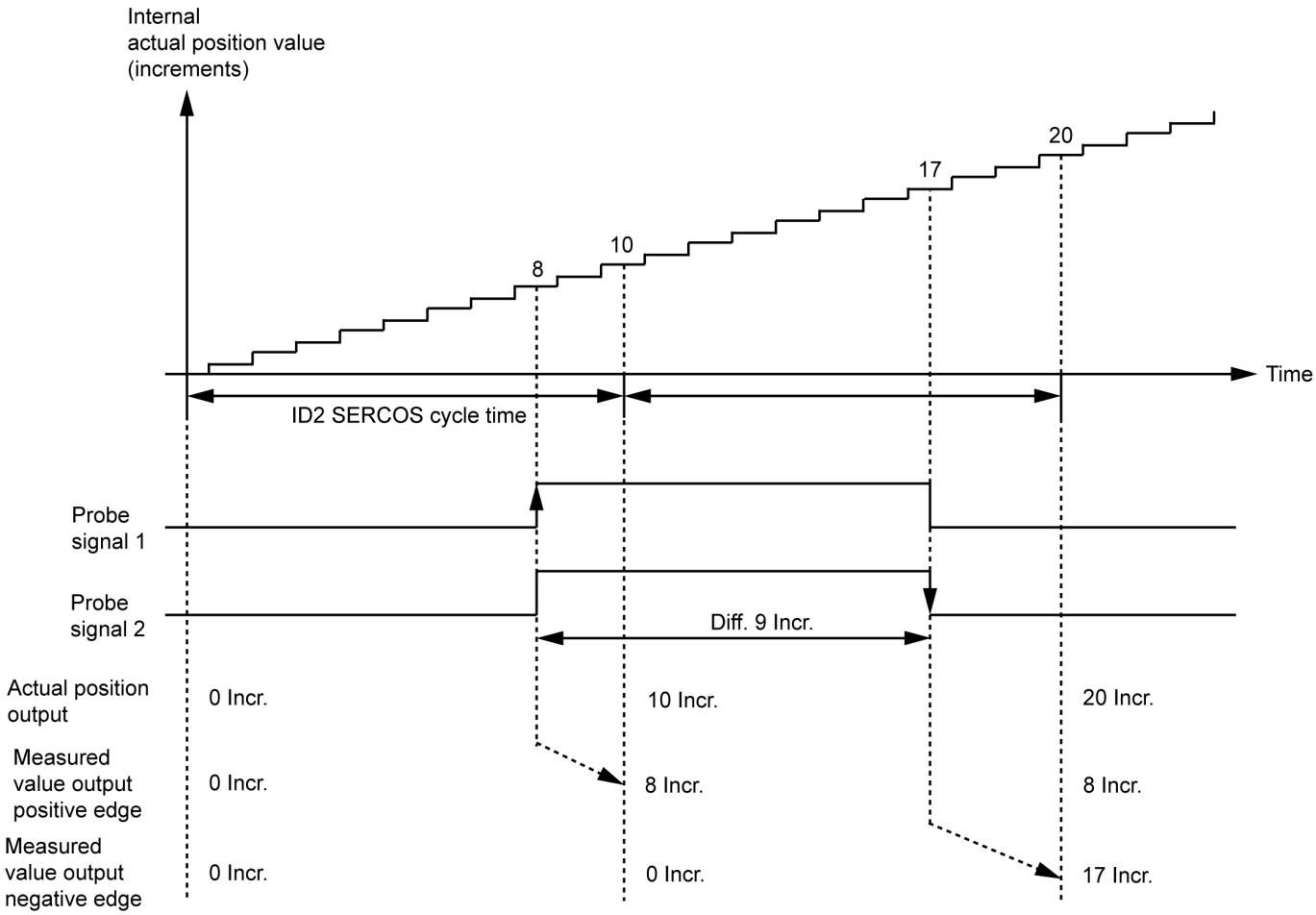
Example: Product position measurement with 2 touch probes

The beginning is determined with touch probe 1 (positive edge) and the end is determined with touch probe 2 (negative edge).

Touch probe value output 1 positive edge = 8 increments

Touch probe value output 2 negative edge = 17 increments

The difference (product length) is 9 increments



2 'Probe function actual position encoder with touch probe signal'

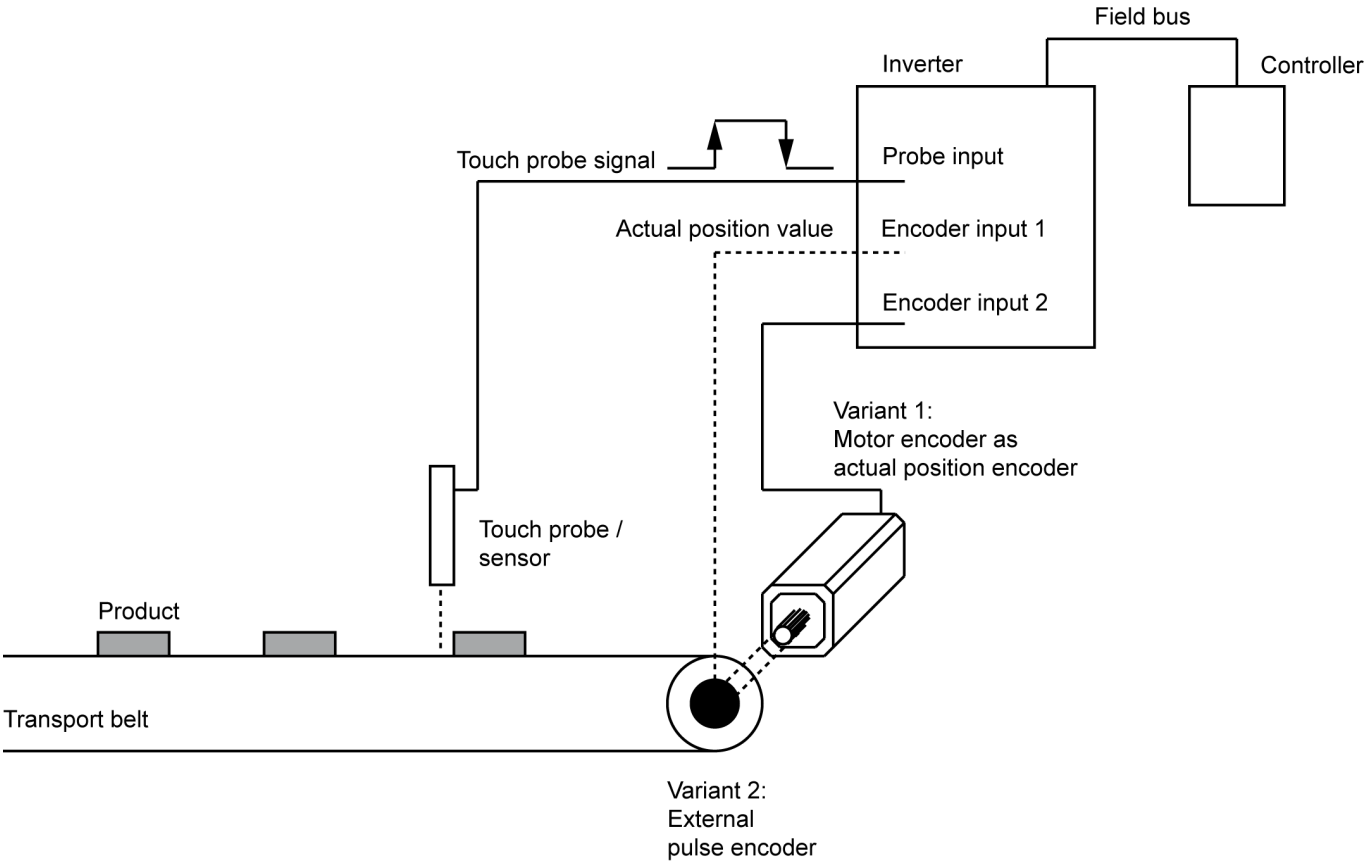
With the function 'Probe function actual position encoder with touch probe signal', a master controller can generate a real-time reference between the actual value of the encoder and a touch probe signal. The real-time reference can, for example, be used for a mark control.

Two touch probes (MT1/MT2) can be connected to the probe inputs (BE3/ME1 - BE2/ME2) on the converter. The probe function can evaluate the positive or the negative edge of an input signal.

The probe function continuously reads in the actual position value from encoder. The actual value is stored in the 'Current counter' with every SERCOS clock pulse.

The touch probe signal stores the actual value for the 'reference counter'.

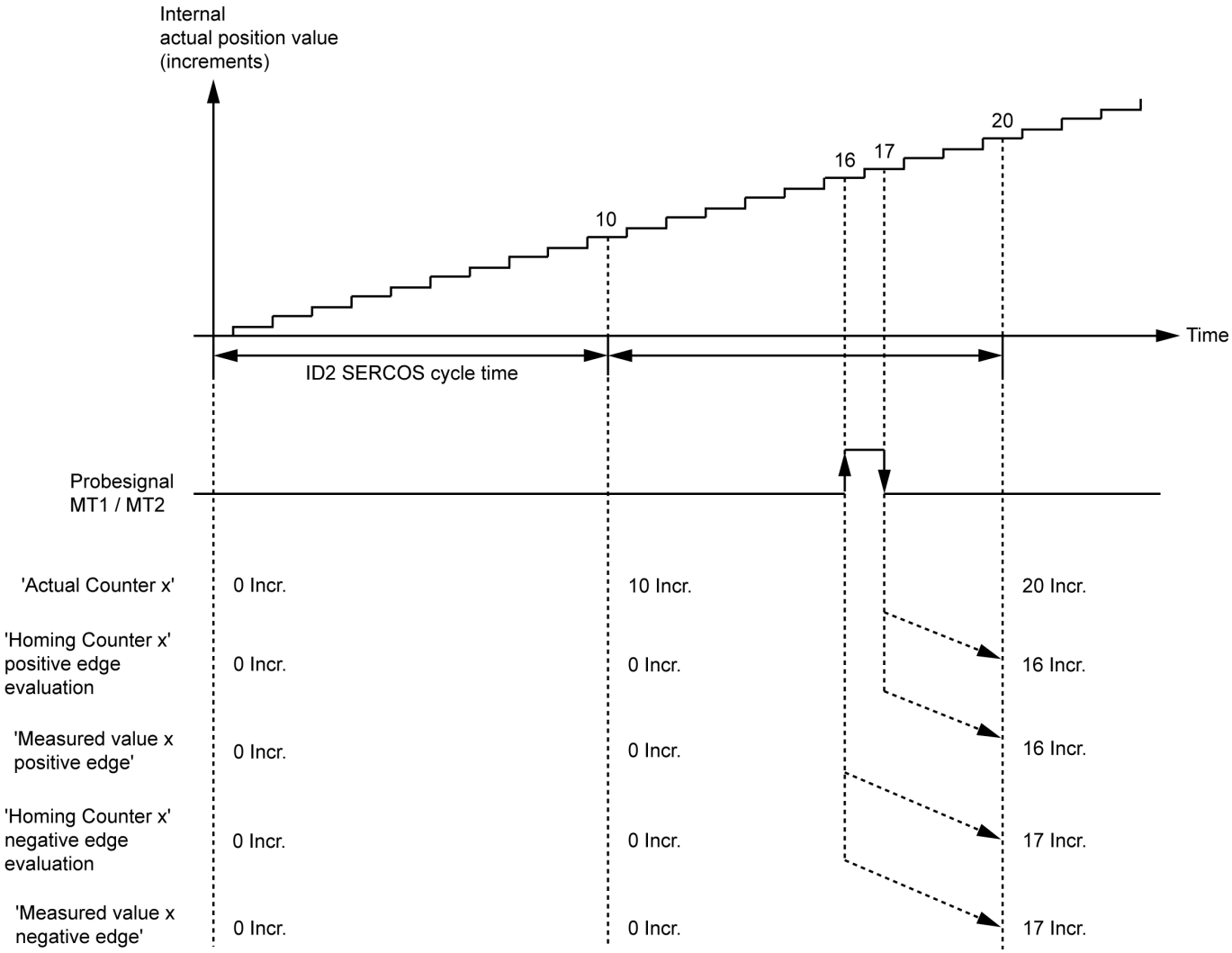
The stored values can subsequently be read out and further processed by a controller.



Actual position encoder

The motor encoder or an external encoder can be used as actual position encoder. The actual position encoder is parametrized in the drive system with ID32953 'Encoder type'.

Example:



Overview of the probe inputs and the associated parameters

Probe input 1 - BE3	Probe input 2 - BE2	Meaning
Code 401	Code 402	Basic setting: A binary input with connected touch probe must be assigned with the 'touch probe' function code.
ID169 'Probe control parameter' Bit 0-1	ID169 'Probe control parameter' Bit 2-3	Basic setting: Selection positive or negative edge evaluation
ID130 'Probe value 1 positive edge'	ID132 'Probe value 2 positive edge'	Probe value: Stored actual position value for positive edge selection
ID131 'Probe value 1 negative edge'	ID133 'Probe value 2 negative edge'	Probe value: Stored actual position value for negative edge selection
ID32948 'Message 4x32' 1. Message	ID32948 'Message 4x32' 2. Message	Basic setting: 'Probe function actual position encoder with touch probe signal' activate / deactivate
ID34047 'Dead time compensation measuring 1'	ID34210 'Dead time compensation measure 2'	Basic setting: Dead time compensation of the input circuitry on the probe input

Probe input 1 - BE3	Probe input 2 - BE2	Meaning
ID34074 'Homing Counter 1'	ID34076 'Homing Counter 2'	Probe value: Actual position value at the point in time of the touch probe signal
ID34075 'Actual Counter 1'	ID34077 'Actual Counter 2'	Probe value: Actual position value at the point in time of the SERCOS clock pulse

Commissioning instructions:

inhibit time probe input ME1/ME2 (BE3/BE2):
The probe input is blocked for 250 µs after every active measurement edge.

2.1 Relevant parameters and function codes

Basic setting probe function

Parameter	Meaning
ID169 'Probe control parameter'	With ID169 'Probe control parameter' determines whether the positive or the negative edge at the measurement input 1 or 2 is evaluated. **Configuration ID169 'Probe control parameter'**

Bit no.	Condition	Meaning
0-1	--	**Edge evaluation touch probe input 1**
	00	No evaluation
	01	Positive edge at the touch probe input 1 is evaluated
	10	Negative edge at the touch probe input 1 is evaluated
2-3	--	**Edge evaluation touch probe input 1**
	00	No evaluation
	01	Positive edge at the touch probe input 2 is evaluated
	10	Negative edge at the touch probe input 2 is evaluated
4-15	0	Reserved
	1	Reserved

Only 1 edge evaluation must be activated per measuring input.
Selecting positive AND negative edge is not allowed.

A binary input with connected touch probe must be assigned with the 'touch probe' function code.

Parameter	Meaning
Code 401	Function code touch probe for BE3 Measurement signal 1 for touch probe function only at BE3 (ID32980 'Port 3 Bit 2')
Code 402	Function code touch probe for BE2 Measurement signal 2 for touch probe function only at BE2 (ID32979 'Port 3 Bit 1')

Relevant parameters during the measurement

Parameter	Meaning
ID32948 'Message 4x32'	**Code for message 1 (probe input 1 - BE3)** Code 0x0024 Edge on the probe input stores current counter state as reference counter 1 **Code for message 2 (probe input 2 - BE2)** Code 0x2400 Edge on the probe input stores current counter state as reference counter 2
ID34074 'Homing Counter 1'	Message 1: The 'Homing Counter 1' stores the position information from ID34075 'Actual Counter 1' at the point where the homing signal occurs.
ID34075 'Actual Counter 1'	Message 1: The 'Actual Counter 1' cyclically saves (each 250 µs) the position information.
ID34076 'Homing Counter 2'	Message 2: The 'Homing Counter 2' stores the position information from ID34077 'Actual Counter 2' at the point where the homing signal occurs.
ID34077 'Actual Counter 2'	Message 2: The 'Actual Counter 2' cyclically saves (each 250 µs) the position information.
ID34047 'Dead time compensation measuring 1'	Dead times can be compensated for with this parameter due to, for example, sensors and input circuits in connection with the touch probe function at the binary input BE3. The measured value is corrected by the configured dead time.
ID34210 'Dead time compensation measure 2'	Dead times can be compensated for with this parameter due to, for example, sensors and input circuits in connection with the touch probe function at the binary input BE2. The measured value is corrected by the configured dead time.

3 'Probe function actual position encoder with SERCOS interface'

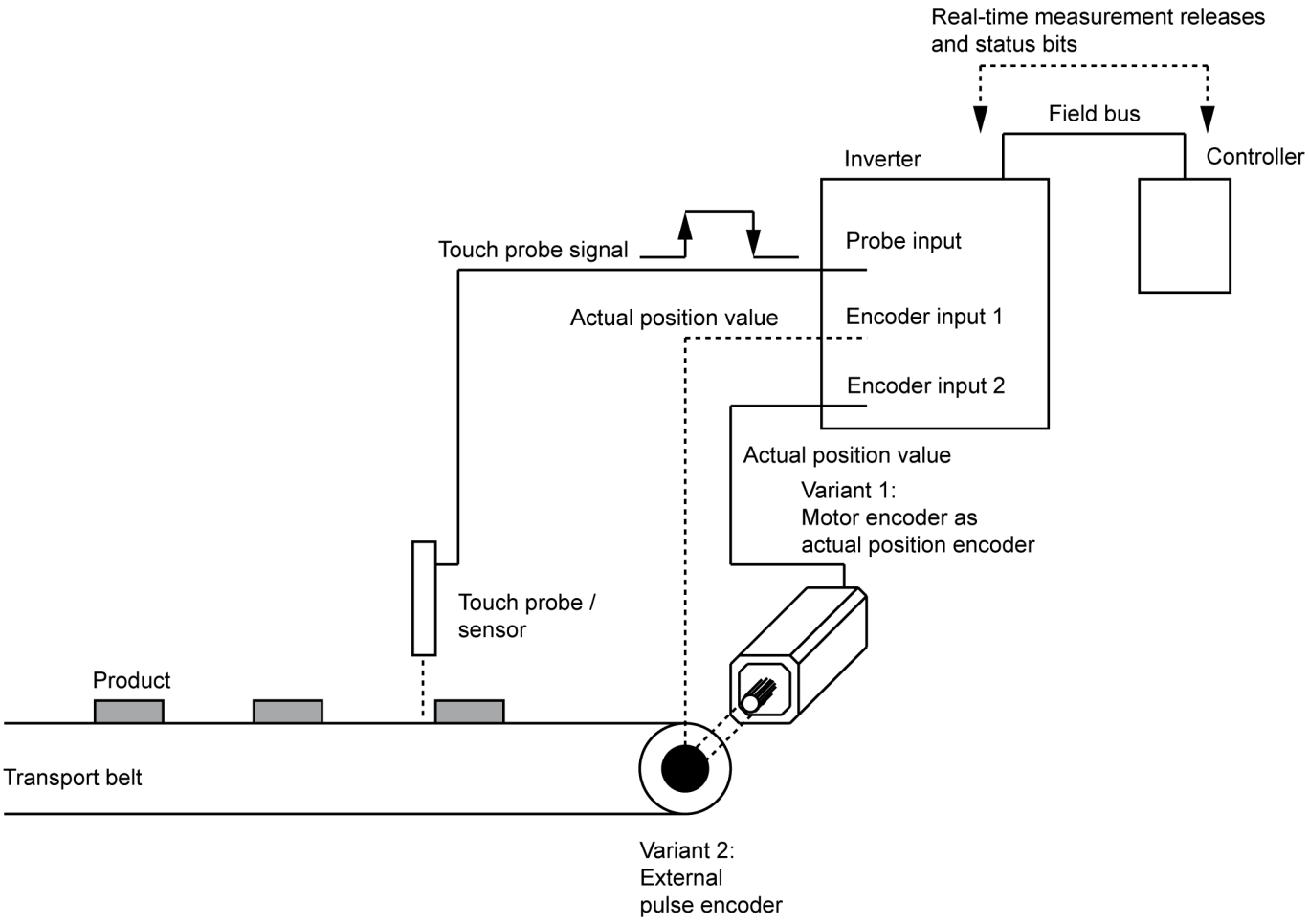
With the 'Probe function actual position encoder with SERCOS interface', a single as well as multiple, fast measurement is possible using real-time bits.

Two touch probes (MT1/MT2) can be connected to the probe inputs (BE3/ME1 - BE2/ME2) on the converter. The probe function can evaluate the positive or the negative edge of an input signal.

As soon as the parametrized measurement signal is detected, the probe function stores the actual position value and sets the corresponding acknowledgment bit.

The stored value can subsequently be read out and further processed by a controller.

After the occurrence of an active edge, the effect of a similar edge is blocked. The probe function must be enabled again after each touch probe enable. The 'enable touch probe' can be assigned to a real-time bit of the ID134 'Master control word'. The 'status probe value recorded' can be assigned to a real-time bit of the ID135 'Drive status word'.



Actual position encoder

The motor encoder or an external encoder can be used as actual position encoder. The actual position encoder is parametrized in the drive system with ID32953 'Encoder type'.

Overview of the probe inputs and the associated parameters

Probe input 1 - BE3	Probe input 2 - BE2	Meaning
Code 401	Code 402	Basic setting: A binary input with connected touch probe must be assigned with the 'touch probe' function code.
ID169 'Probe control parameter' Bit 0-1	ID169 'Probe control parameter' Bit 2-3	Basic setting: Selection positive or negative edge evaluation
ID130 'Probe value 1 positive edge'	ID132 'Probe value 2 positive edge'	Probe value: Stored actual position value for positive edge selection

Probe input 1 - BE3	Probe input 2 - BE2	Meaning
ID131 'Probe value 1 negative edge'	ID133 'Probe value 2 negative edge'	Probe value: Stored actual position value for negative edge selection
ID170 'Command probe cycle'	ID170 'Command probe cycle'	Control signal: Probe function ON/OFF
ID179 'Probe status' Bit 0	ID179 'Probe status' Bit 2	Status: Probe value positive recorded Bit 0 identical to ID409 'Probe 1 positive latch' Bit 2 identical to ID411 'Probe 2 positive latch'
ID179 'Probe status' Bit 1	ID179 'Probe status' Bit 3	Status: Probe value negative recorded Bit 1 identical to ID410 'Probe 1 negative latch' Bit 3 identical to ID412 'Probe 2 negative latch'
ID405 'Probe 1 enable'	ID406 'Probe 2 enable'	Control signal: For every measurement, the enable must be set again with a 0-1 edge in Bit 0. The enable can be assigned to a real-time bit of the ID134 'Master control word'.
ID409 'Probe 1 positive latch'	ID411 'Probe 2 positive latch'	Status: Probe value positive recorded Probe value negative recorded
ID410 'Probe 1 negative latch'	ID412 'Probe 2 negative latch'	The status of the Ident numbers ID409 'Probe 1 positive latch' - ID412 'Probe 2 negative latch' is identical to the individual bits in ID179 'Probe status' The Ident numbers ID409 - ID412 can be assigned to a real-time status bit in ID135 'Drive status word'.
ID34047 'Dead time compensation measuring 1'	ID34210 'Dead time compensation measure 2'	Basic setting: Dead time compensation of the input circuitry on the probe input

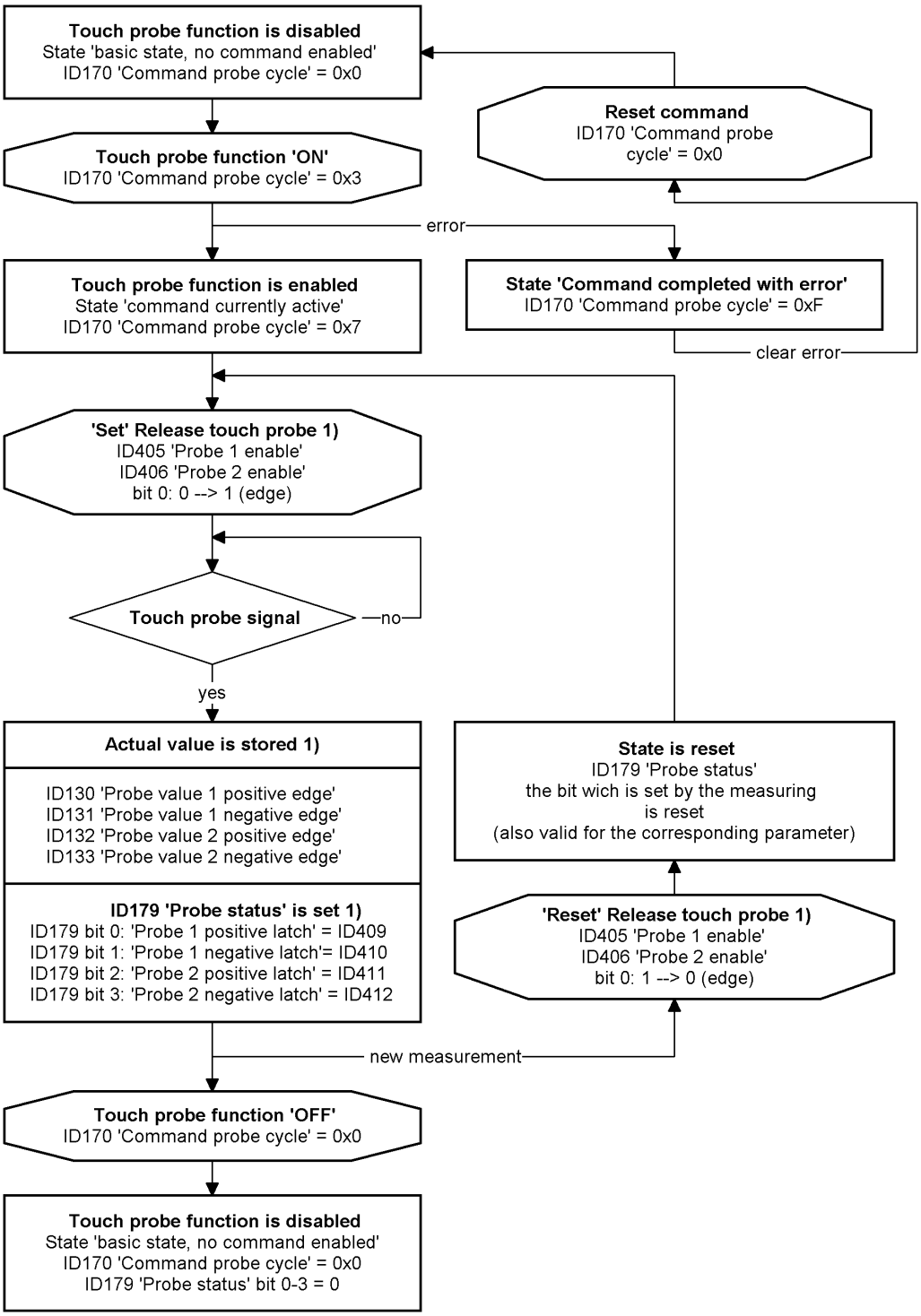
Commissioning instructions:

inhibit time probe input ME1/ME2 (BE3/BE2):
The probe input is blocked for 250 µs after every active measurement edge.

As of the start of the probe function, a homing is not permitted as the measurement cycle is otherwise aborted.

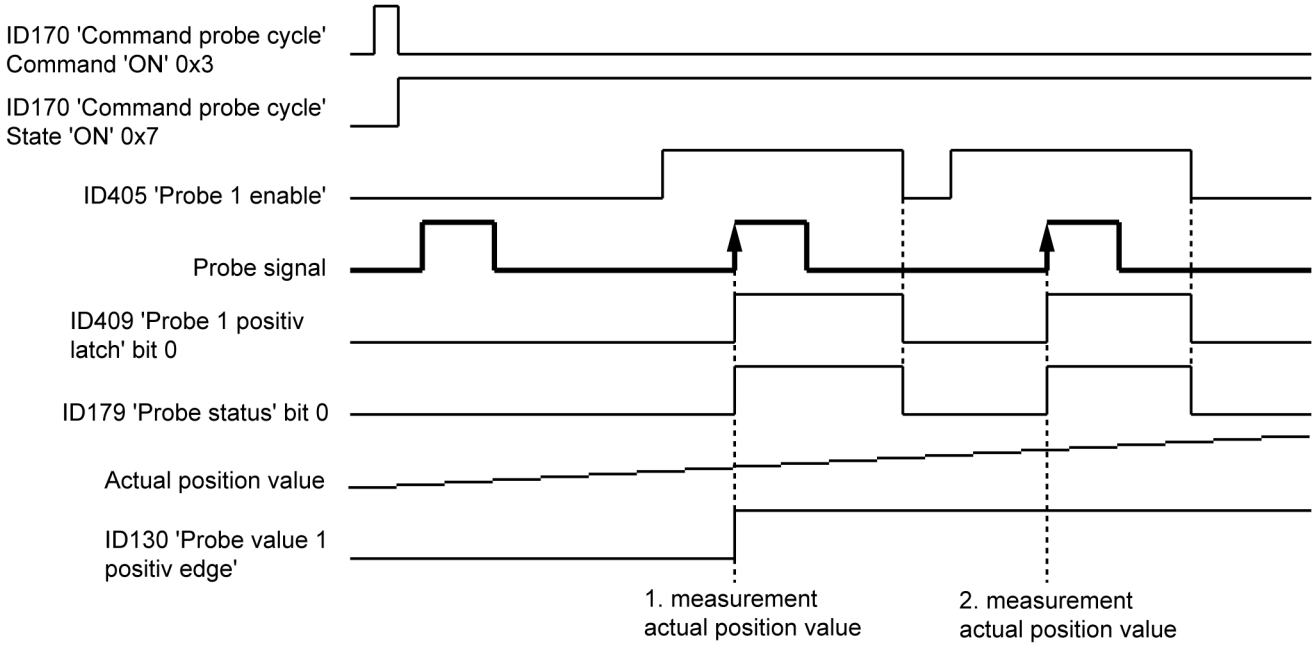
3.1 Sequence

The sequence during measurement must be commanded with a controller.

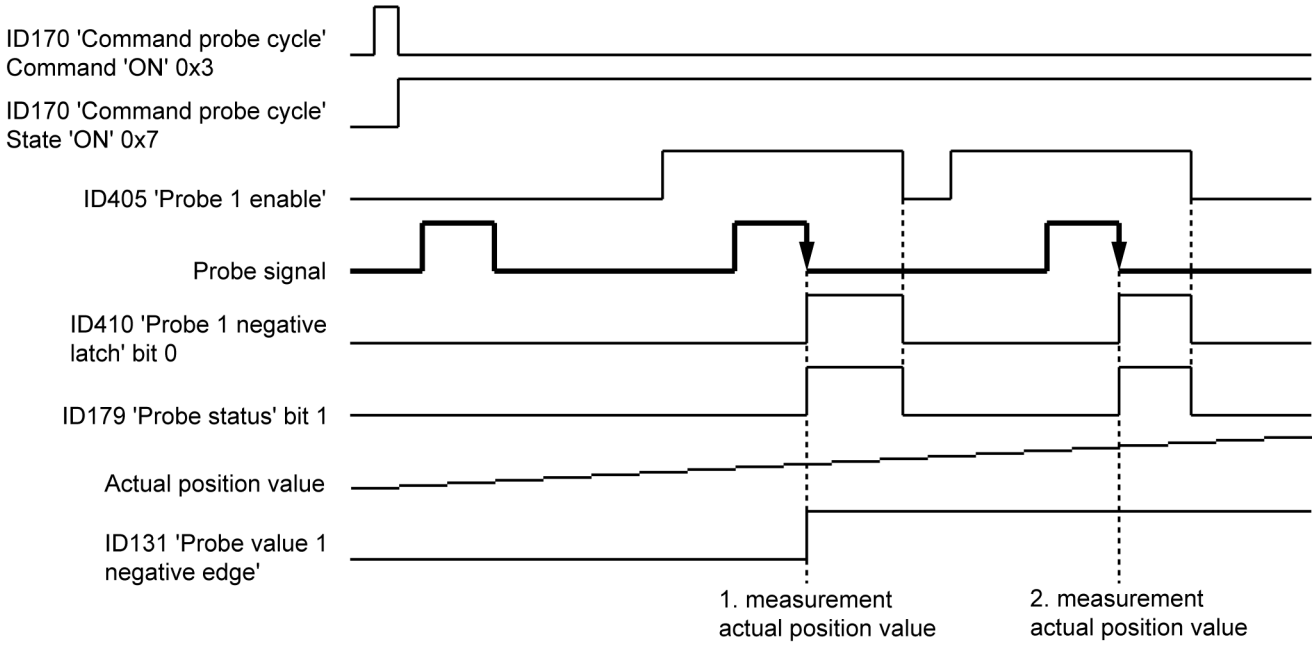


1) Parameter dependent on the probe input used and the parametrized edge evaluation

Example: ID169 'Probe control parameter' bit 0 = 1 / positive edge at the measurement input 1 is evaluated



Example: ID169 'Probe control parameter' bit 1 = 1 / negative edge at the measurement input 1 is evaluated



3.2 Relevant parameters and function codes

Basic settings of the probe function

<table>
<tr><th>Parameter</th><th>Meaning</th></tr>
<tr><td>ID169 'Probe control parameter'</td><td>With ID169 'Probe control parameter' determines whether the positive or the negative edge at the measurement input 1 or 2 is evaluated.

Configuration ID169 'Probe control parameter'
<table>
<tr><th>Bit no.</th><th>Condition</th><th>Meaning</th></tr>
<tr><td rowspan="4">0-1</td><td>--</td><td>Edge evaluation touch probe input 1</td></tr>
<tr><td>00</td><td>No evaluation</td></tr>
<tr><td>01</td><td>Positive edge at the touch probe input 1 is evaluated</td></tr>
<tr><td>10</td><td>Negative edge at the touch probe input 1 is evaluated</td></tr>
<tr><td rowspan="4">2-3</td><td>--</td><td>Edge evaluation touch probe input 1</td></tr>
<tr><td>00</td><td>No evaluation</td></tr>
<tr><td>01</td><td>Positive edge at the touch probe input 2 is evaluated</td></tr>
<tr><td>10</td><td>Negative edge at the touch probe input 2 is evaluated</td></tr>
<tr><td rowspan="2">4-15</td><td>0</td><td>Reserved</td></tr>
<tr><td>1</td><td>Reserved</td></tr>
</table>

Only 1 edge evaluation must be activated per measuring input.
Selecting positive AND negative edge is not allowed.</td></tr>
<tr><td>ID34047 'Dead time compensation measuring 1'</td><td>Dead times can be compensated for with this parameter due to, for example, sensors and input circuits in connection with the touch probe function at the binary input BE3. The measured value is corrected by the configured dead time.</td></tr>
<tr><td>ID34210 'Dead time compensation measure 2'</td><td>Dead times can be compensated for with this parameter due to, for example, sensors and input circuits in connection with the touch probe function at the binary input BE2. The measured value is corrected by the configured dead time.</td></tr>
</table>

A binary input with connected touch probe must be assigned with the 'touch probe' function code.

Parameter	Meaning
Code 401	Function code touch probe for BE3 Measurement signal 1 for touch probe function only at BE3 (ID32980 'Port 3 Bit 2')
Code 402	Function code touch probe for BE2 Measurement signal 2 for touch probe function only at BE2 (ID32979 'Port 3 Bit 1')

Relevant parameters during the measurement

Parameter	Meaning
ID130 'Probe value 1 positive edge'	A positive edge at the probe input 1 stores the actual position value. The stored actual position value can be read at a later time by a PLC.
ID131 'Probe value 1 negative edge'	A negative edge at the probe input 1 stores the actual position value. The stored actual position value can be read at a later time by a PLC.
ID132 'Probe value 2 positive edge'	A positive edge at the probe input 2 stores the actual position value. The stored actual position value can be read at a later time by a PLC.
ID133 'Probe value 2 negative edge'	A negative edge at the probe input 2 stores the actual position value. The stored actual position value can be read at a later time by a PLC.

<table>
<tr><th>Parameter</th><th>Meaning</th></tr>
<tr><td>ID170 'Command probe cycle'</td><td>With the command 'Command probe cycle' the 'Probe function actual position encoder with SERCOS interface' is started.
With this command a single measuring and a multiple, real-time measurement of actual positions is possible by using real-time bits
Start:
The 'Command probe cycle' is started by the value 0x3 is written into the parameter.
Status:
Read the parameter to get the status of the command.<table><tr><th>Read value</th><th>Meaning</th></tr><tr><td>0x0</td><td>Basic state, no command active</td></tr><tr><td>0x7</td><td>'Probe function actual position encoder with SERCOS interface' active</td></tr><tr><td>0xF</td><td>Command completed with error</td></tr></table>Stop:
The command is stopped or an error (status 0xF) cleared by the value 0x0 is written into the parameter</td></tr>
<tr><td>ID179 'Probe status'</td><td>With active 'Probe function actual position encoder with SERCOS interface' the status bits will be set if a corresponding edge will be detected at a corresponding measurement input.

ID179 bit 0-1 is reset as soon as the following conditions change:
ID405 'Probe 1 enable' is reset (1 → 0)
'Probe function actual position encoder with SERCOS interface' is deactivated with ID170 'Command probe cycle' (command 0x0)
ID179 bit 2-3 is reset as soon as the following conditions change:
ID406 'Probe 2 enable' is reset (1 → 0)
'Probe function actual position encoder with SERCOS interface' is deactivated with ID170 'Command probe cycle' (command 0x0)
Configuration ID179 'Probe status'<table><tr><th>Bit no.</th><th>Condition</th><th>Meaning</th></tr><tr><td rowspan="2">0</td><td>0</td><td>'Probe 1 positive latch' not detected (identical ID409)</td></tr><tr><td>1</td><td>'Probe 1 positive latch' (identical ID409)</td></tr><tr><td rowspan="2">1</td><td>0</td><td>'Probe 1 negative latch' not detected (identical ID410)</td></tr><tr><td>1</td><td>'Probe 1 negative latch' (identical ID410)</td></tr><tr><td rowspan="2">2</td><td>0</td><td>'Probe 2 positive latch' not detected (identical ID411)</td></tr><tr><td>1</td><td>'Probe 2 positive latch' (identical ID411)</td></tr><tr><td rowspan="2">3</td><td>0</td><td>'Probe 2 negative latch' not detected (identical ID412)</td></tr><tr><td>1</td><td>'Probe 2 negative latch' (identical ID412)</td></tr><tr><td rowspan="2">4-15</td><td>0</td><td>Reserved</td></tr><tr><td>1</td><td>Reserved</td></tr></table></td></tr>
<tr><td>ID405 'Probe 1 enable'</td><td>For each measurement, the release must be reset in ID405 with a 0-1 edge in bit 0.
The release can be assigned to a real-time control bit in ID134 'Master control word'.</td></tr>
<tr><td>ID406 'Probe 2 enable'</td><td>For each measurement, the release must be reset in ID406 with a 0-1 edge in bit 0.
The release can be assigned to a real-time control bit in ID134 'Master control word'.</td></tr>
</table>

Parameter	Meaning
ID409 'Probe 1 positive latch'	With active 'Probe function actual position encoder with SERCOS interface' bit 0 is set with the positive edge at the measurement input 1 in ID409 and entered the measured value in ID130. The state 'Probe 1 positive latch' can be assigned to a real-time status bit in ID135 'Drive status word'. ID409 bit 0 is reset as soon as the following conditions change: • ID405 'Probe 1 enable' is reset (1 → 0) • 'Probe function actual position encoder with SERCOS interface' is deactivated with ID170 'Command probe cycle' (command 0x0) ID409 bit 0 is identical to ID179 'Probe status' bit 0.
ID410 'Probe 1 negative latch'	With active 'Probe function actual position encoder with SERCOS interface' bit 0 is set with the negative edge at the measurement input 1 in ID410 and entered the measured value in ID131. The state 'Probe 1 negative latch' can be assigned to a real-time status bit in ID135 'Drive status word'. ID410 bit 0 is reset as soon as the following conditions change: • ID405 'Probe 1 enable' is reset (1 → 0) • 'Probe function actual position encoder with SERCOS interface' is deactivated with ID170 'Command probe cycle' (command 0x0) ID410 bit 0 is identical to ID179 'Probe status' bit 1.
ID411 'Probe 2 positive latch'	With active 'Probe function actual position encoder with SERCOS interface' bit 0 is set with the positive edge at the measurement input 2 in ID411 and entered the measured value in ID132. The state 'Probe 2 positive latch' can be assigned to a real-time status bit in ID135 'Drive status word'. ID411 bit 0 is reset as soon as the following conditions change: • ID406 'Probe 2 enable' is reset (1 → 0) • 'Probe function actual position encoder with SERCOS interface' is deactivated with ID170 'Command probe cycle' (command 0x0) ID411 bit 0 is identical to ID179 'Probe status' bit 2.
ID412 'Probe 2 negative latch'	With active 'Probe function actual position encoder with SERCOS interface' bit 0 is set with the negative edge at the measurement input 2 in ID412 and entered the measured value in ID133. The state 'Probe 2 negative latch' can be assigned to a real-time status bit in ID135 'Drive status word'. ID412 bit 0 is reset as soon as the following conditions change: • ID406 'Probe 2 enable' is reset (1 → 0) • 'Probe function actual position encoder with SERCOS interface' is deactivated with ID170 'Command probe cycle' (command 0x0) ID412 bit 0 is identical to ID179 'Probe status' bit 3.