



## Austausch der Elektronik / des Klemmenmoduls am Micropilot S, FMR 53X



Es dürfen nur identische, originale E+H-Ersatzteile eingesetzt werden.  
 Das Gerät darf nur von Fachpersonal repariert und gewartet werden. Dabei sind die Gerätedokumentation, die einschlägigen Normen, die gesetzlichen Vorschriften und die Zertifikate zu beachten!

Für den Einsatz im eichpflichtigen Verkehr ist die Verplombung des Verriegelungsschalters vorgesehen. Über diesen Schalter kann der Zugriff auf die Elektronik verhindert und die Einstellung des Gerätes verriegelt werden. In diesem Fall muss nach dem Öffnen der Plombe (notwendig beim Austausch von Ersatzteilen) ein Eichbeamter den Micropilot bei der Inbetriebnahme der Messung erneut abnehmen und verplomben!

**Vor der Demontage ist sicherzustellen, dass die Versorgungsspannung für das Gerät abgeschaltet ist.**

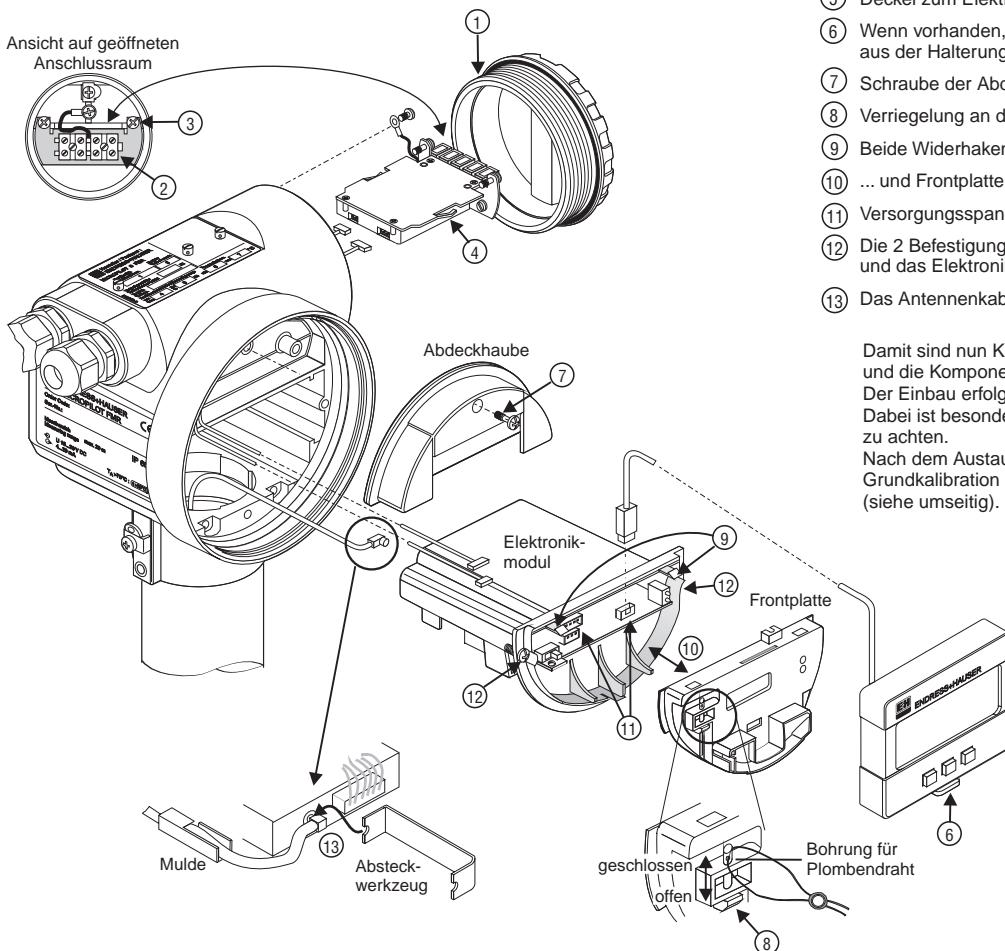


**Ex i-Geräte:** Die Reparatur ist so durchzuführen, dass die Spannungsfestigkeit der Ex ia Stromkreise gegen Erde erhalten bleibt. Bei Bedarf kann eine Prüfung mit 500 Veff über 60 s durchgeführt werden.

Bei Änderungen am Gerät, welche die Produktstruktur (siehe Betriebsanleitung) betreffen, ist ein Änderungstypenschild (Best Nr. 5200 5627) am Gehäuse anzubringen. Zusätzlich sind in der Servicematrix in den Feldern 0D08 und 0D09 (Anzeigemodul VU 331) diese Änderung einzutragen.

### Der Austausch erfordert folgende Werkzeuge:

- Kreuzschlitzschraubendreher Größe 1
- Schlitzschraubendreher für M3 / M4
- Absteckwerkzeug für Antennenstecker (Best. Nr. 5200 7646)
- 6kant Innensteckschlüssel SW 2,5 / SW 4 / SW 5
- ggf. eine Pinzette



### Reihenfolge der Demontage:

- 1 Deckel zum Anschlussraum abschrauben
- 2 Kabel am Klemmenmodul abklemmen
- 3 Befestigungsschrauben (2 Stück) am Klemmenmodul abschrauben und Erdungskabel lösen
- 4 Klemmenmodul herausziehen und die Steckverbindungen auf der Rückseite lösen  
Ein neues Klemmenmodul kann jetzt eingesetzt werden.
- 5 Deckel zum Elektronikraum abschrauben (4 Umdrehungen)
- 6 Wenn vorhanden, ein Display durch Hochdrückendes Hakens aus der Halterung lösen
- 7 Schraube der Abdeckhaube lösen und Haube abnehmen
- 8 Verriegelung an der Frontplatte öffnen ggf. Plombe entfernen
- 9 Beide Widerhaken am Modulgehäuse leicht eindrücken ...
- 10 ... und Frontplatte nach vorn abziehen
- 11 Versorgungsspannung, Signalleitung und Display abstecken
- 12 Die 2 Befestigungsschrauben des Elektronikmoduls lösen und das Elektronikmodul aus dem Gehäuse ziehen
- 13 Das Antennenkabel mittels Werkzeug abstecken

Damit sind nun Klemmenmodul und Elektronik ausgebaut, und die Komponenten können ersetzt werden. Der Einbau erfolgt in umgekehrter Reihenfolge. Dabei ist besonders auf 13 Anschluss des Antennenkabels zu achten.

Nach dem Austausch der Elektronik ist das Gerät durch eine Grundkalibration wieder in den Messzustand zu versetzen (siehe umseitig).



Bei zertifizierten Geräten ist die Reparatur eines Gerätes zu dokumentieren! Hierzu gehört die Angabe der Geräte-Seriennummer, Reparaturdatum, Art der Reparatur und ausführender Techniker.













## Exchange of electronics / terminal module for Micropilot S, FMR 53X



Only identical, original E+H spare parts may be used.  
 The instrument may only be maintained and repaired by qualified personnel. The device documentation, applicable standards and legal requirements as well as any certificates have to be observed!

The custody locking switch can be sealed for custody transfer applications. Access to the electronics can be reverted by means of a custody locking switch that locks the device settings. In this case, after any breaking of the seal (required for exchange of parts), the Micropilot must again be tested and sealed by an official at commissioning!

**Before disassembly, ensure that the operating voltage for the instrument has been switched off.**



Ex i-devices: The repair has to be performed such, that the voltage resistance of the Ex ia circuits against ground is maintained. If required, a test can be performed with 500 Veff over a time period of 60 s.

Any changes of the device that affect the product structure (see operating manual) require the installation of an modification type plate (order No. 5200 5627) with the new order structure. In addition, note these changes in the fields 0D08 and 0D09 of the service matrix (display module VU 331).

### The following tools are required for the exchange:

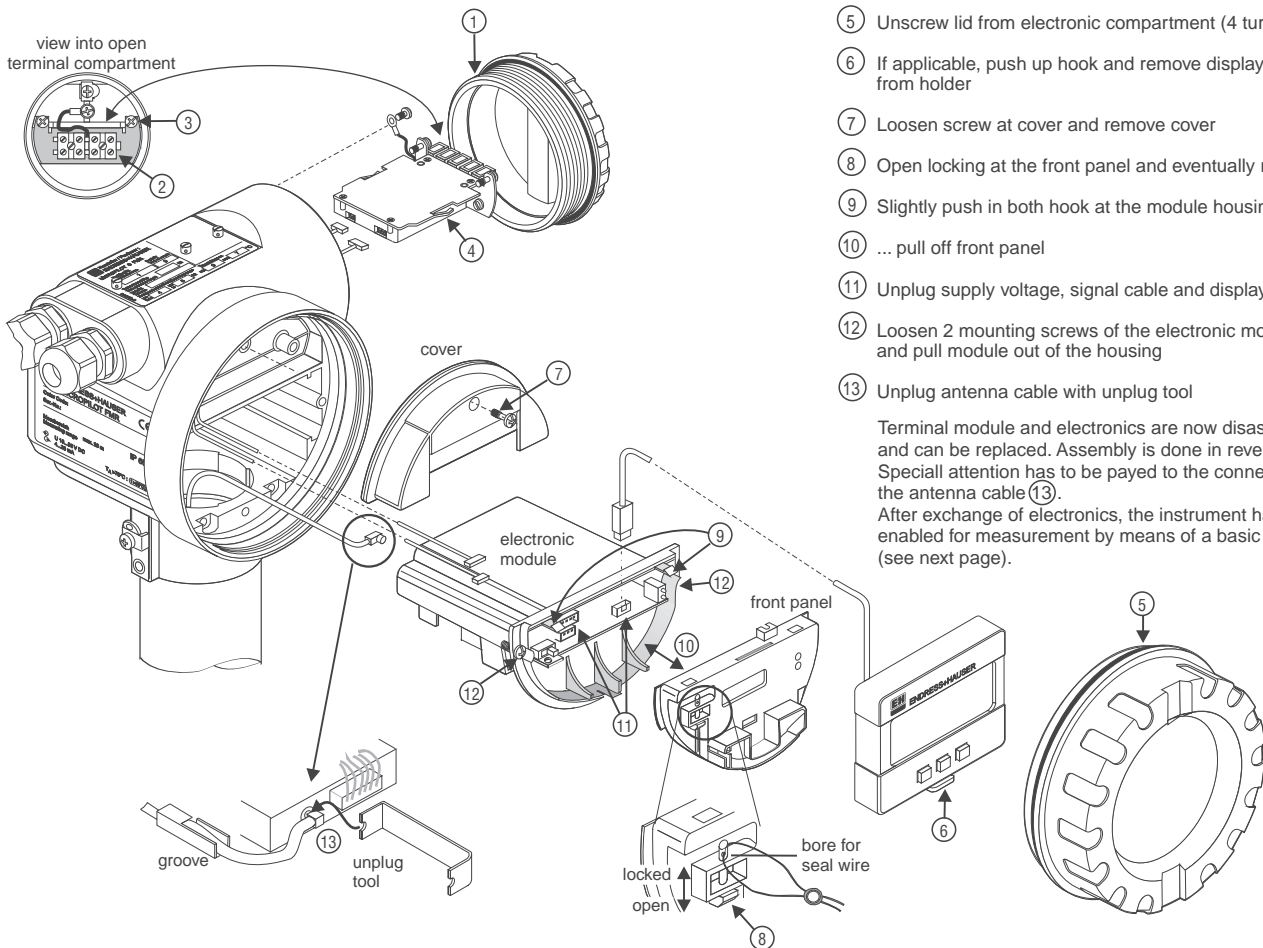
- Philips screw driver size 1
- flat screwdriver for M3 / M4
- unplug tool for antenna plug (order no. 5200 7646)
- Allen wrench AF 2.5 / AF 4 / AF 5
- eventually tweezers

### Order of disassembly:

- ① Unscrew lid from terminal compartment
  - ② Disconnect cable at terminal module
  - ③ Unscrew mounting screws (2 pcs.) at terminal module and detach ground wire
  - ④ Pull out terminal module and unplug connectors on the back side
- A new terminal module can now be installed.
- ⑤ Unscrew lid from electronic compartment (4 turns)
  - ⑥ If applicable, push up hook and remove display from holder
  - ⑦ Loosen screw at cover and remove cover
  - ⑧ Open locking at the front panel and eventually remove seal
  - ⑨ Slightly push in both hook at the module housing and ...
  - ⑩ ... pull off front panel
  - ⑪ Unplug supply voltage, signal cable and display
  - ⑫ Loosen 2 mounting screws of the electronic module and pull module out of the housing
  - ⑬ Unplug antenna cable with unplug tool

Terminal module and electronics are now disassembled and can be replaced. Assembly is done in reverse order. Special attention has to be payed to the connection of the antenna cable ⑬.

After exchange of electronics, the instrument has to be enabled for measurement by means of a basic calibration (see next page).



Any repair on an certified device has to be documented!  
 This includes the device serial number, repair date, type of repair and name of the repair technician.

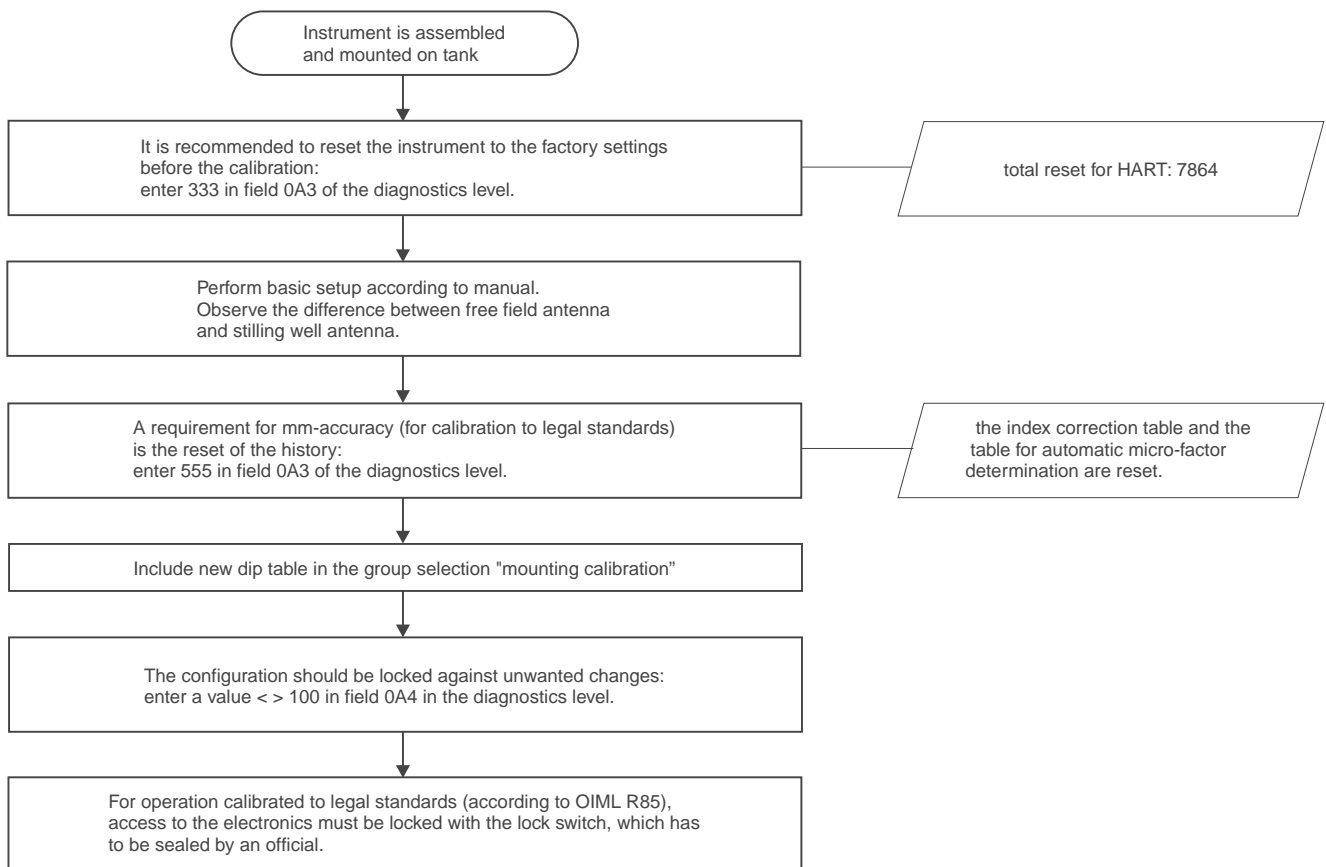
## Calibration of the Micropilot S after exchange of electronics

Antenna / electronics and HF module are paired and can therefore not be exchanged separately. Thus, a specific basic calibration does not apply. An exchange of individual components in a workshop for an error analysis in case of a repair is possible, however, installation of a "wrong" assembly leads to significant measuring errors considerably outside the specifications.

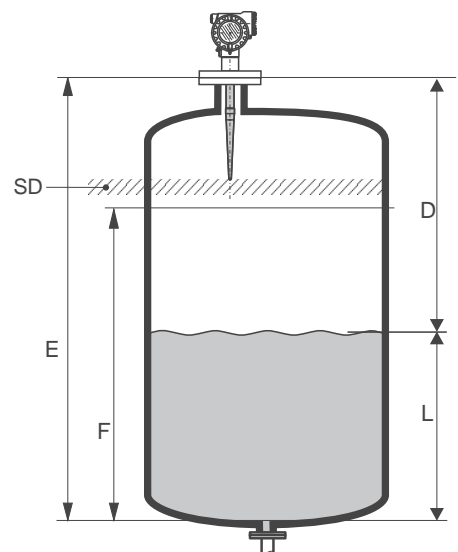
### Preparation for a level calibration

After the instrument has been installed according to the instructions, it has to be aligned for its electrical field (see chapter "Alignment of installed instrument") and to be newly configured.

In case all parameters have been stored from the original calibration (upload), a download saves the complete new calibration process.



- E = zero point (empty)  
set in 005
- F = span (full)  
set in 006
- D = distance (distance flange / product)  
displayed in 0A5
- L = level  
displayed in 0A6
- SD = safety distance  
set in 015







# Micropilot S, service matrix HART (display module)

software version 2.0

SM09F/00/05.02

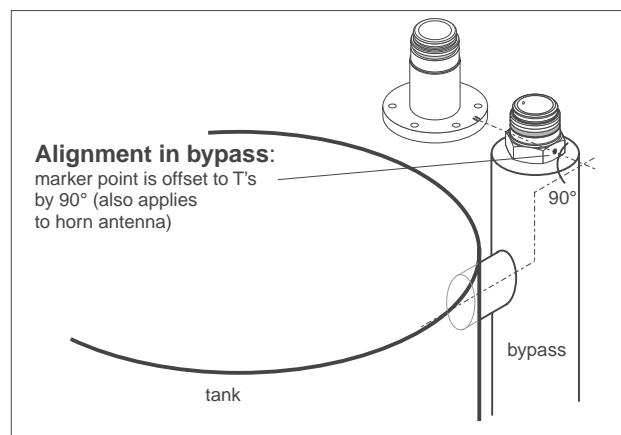
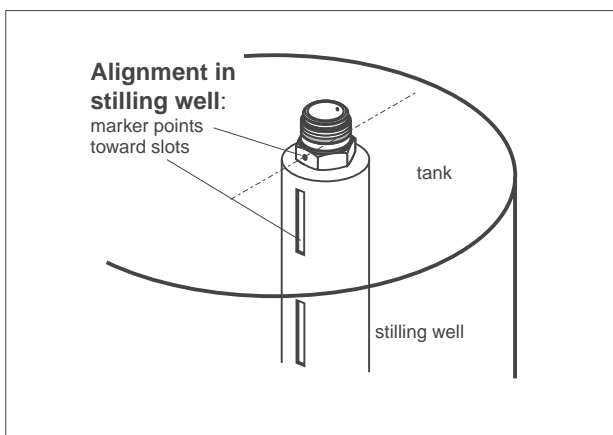
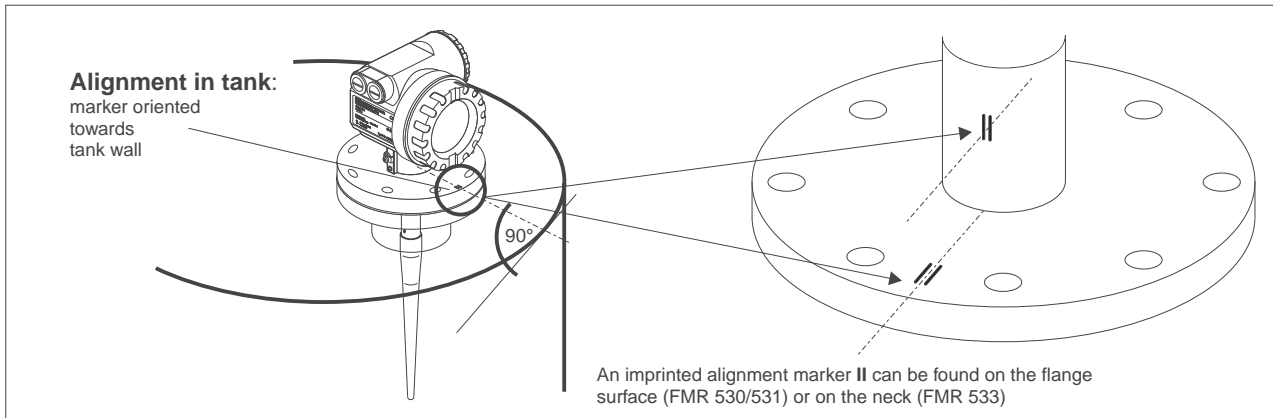
	0	1	2	3	4	5	6	7	8	9	
<b>0D0</b>	<b>Info</b> 0D00	present amplitude 0D01	amplitude over mapping 0D02	amplitude over FAC 0D03	unfiltered distance	present edge parameter	present FEF first echo factor		device name FMR53x	order code	back to function group
<b>0D1</b>	<b>Distance</b> 0D10	MAM filter length 0D11	MAM filter border 0D12	low pass filter [s]	hysteresis width [mm]	max. fill speed [mm/s]	max. drain speed [mm/s]	unfiltered dist. raw [mm]	unfiltered dist. fine [mm]	unfiltered dist. phase [mm]	back to function group
<b>0D2</b>	<b>Envelope</b> 0D20	envelope statistics 0D21	envelope smoothing		env. avg. count 1:8;16	ZF average an / aus				envelope energy [dB]	back to function group
<b>0D3</b>	<b>Mapping</b> 0D30	mapping adder	mapping scan rate [dB]	mapping average	fact. map. valid an; aus; löschen	FAC adder [dB]	FAC scan rate	range factory map [m]	fact. map valid not active; active	cust. map valid not active; active	back to function group
<b>0D4</b>	<b>Edge</b> 0D40	edge detect. mode front; behind; middle of echo	edge parameter [dB]							present edge parameter [dB]	back to function group
<b>0D5</b>	<b>First echo</b> 0D50	first echo factor [dB]	FEF threshold [dB]	FEF at near distance [dB]	FEF distance near [mm]	FEF distance far [mm]	FEF edge [dB]			present FEF [dB]	back to function group
<b>0D6</b>	<b>Tank bottom detection</b> 0D60	tank bottom det. aus; an	min. amplitude tank bot. detec. [dB]	max. level tank bot. detec. [mm]						fill / drain speed [mm / s]	back to function group
<b>0D7</b>	<b>Module</b> 0D70	HF module • pI1.1 • pI1.2 • pI11.1 • pI11.2	zero distance [mm]					pres. micro fact.	module frequen. [MHz]	trig. fail count	back to function group
<b>0D8</b>	<b>Antenna table</b> 0D80	antenna type rod; horn; dish; planar	inactive length [mm]	total length [mm]	max. measuring distance [m]				pos. reference pulse [mm]	ampl. reference pulse [dB]	back to function group
<b>0D9</b>	<b>Algorithm 1</b> 0D90	IC default value 0D91	quali calc. PD 0D92	present PD [mm]	anal. phase state aus; an	IC save begin [mm]	IC save end [mm]	IC state	IC pres. value	IC used value	back to function group
<b>0DA</b>	<b>Algorithm 2</b> 0DA0	fine envelope variante 0DA1									back to function group
<b>0DB</b>	<b>gain settings</b> 0DB0	aut. base gain aus; an	base gain val.	automatic gain aus; an	near dist. gain [mm]	far distance gain [mm]			distance gain [mm]	pres. gain value	back to function group
<b>0DC</b>	<b>System 1</b> 0DC0	plausible funct. aus; an	plausible funct. max. delta [mm]	plausible funct. upper area [mm]	display version VU331 XX	calc. cycle time [ms]		temp. of electr. [C]	software version application	parameter vers. application	back to function group
<b>0DD</b>	<b>System 2</b> 0DD0	D/A adjust 4 mA not PROFIBUS PA	D/A adjust 20 mA not PROFIBUS PA	debug index 1	debug index 2	debug value					back to function group
<b>0DF</b>	<b>Debug</b> 0DF0	debug index 1	debug index 2	debug value				error state algorithms	state algorithms	HW fail counter	back to function group

## Alignment of an installed instrument according to the electrical field

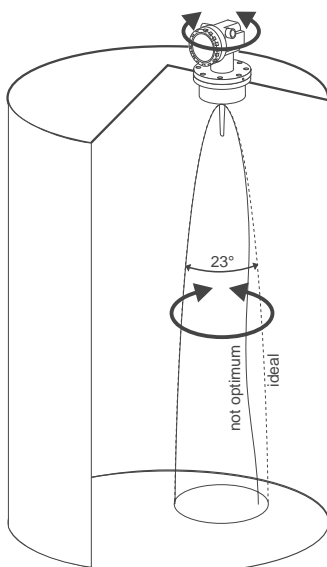
The beam pattern always consists of an electrical and a magnetical field, oriented to each other with a 90° offset.

The alignment marker on the threaded connection or flange marks the virtual horizontal extension of the antenna coupling, thus the polarization of the electrical field in the beam pattern.

The measurement can be optimized by rotating the threaded boss or flange (and therefore the electromagnetic fields). For this purpose, the echo signal in the envelope curve has to be maximized (envelope curve display on display unit in operating matrix field 09C).



The figures show the installation specific alignments. The planar antenna FMR 532 does not have to be aligned. These alignments are optimum based on general experience. However, under certain circumstances another alignment can be better.



A microwave measurement can be negatively influenced by the electrical field being non-homogenous, non-symmetrical or subject to interference reflections etc. The sketch shows how the indicated field can be oriented differently by turning the instrument and the antenna.

This allows an optimization of the received signal.

