

Tilt Switches, Tilt Sensors, and Control Units

MN-TS01100 – KBT Europe – powered by EmWeA



Installation and Operation Manual

V01.01



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1 Tilt Switches and Sensors

1.1 Safety Instructions

-  Read this manual carefully before installing KBT Europe tilt switches/sensors. Keep this manual safe for future reference.
-  Tilt switches/sensors are used to detect the presence or absence of bulk material. Common applications are:
 - Plugged chute: Tilt switches/sensors can be installed in a chute to detect when it's blocked.
 - High and low level: Tilt switches/sensors can be used to detect the high or low flow level for bulk in a storage space.
 - Flow: Tilt switches/sensors can be installed above conveyors to detect material flow.
-  Any improper installation or any tampering of the device may cause personnel injury or property damage. The installation and maintenance must be performed by specialized and authorized personnel.
-  This product is not allowed for use in environments with potentially explosive atmosphere unless it has been optionally certified for this purpose.
-  KBT Europe tilt switches/sensors are designed and manufactured according to IEC international standard and EN European regulations.
-  KBT and EmWeA reserve the right to change the features and data shown in this document at any time without notice.

1.2 Technical Specifications

1.2.1 Mercury-free Tilt Switches CB-39NM and SS-43NM

Enclosure:	CB-39NM: Cast iron, nickel plated SS-43NM: Stainless steel
Protection degree:	IP 68
Cable length:	8 m* * Custom cable length is available upon request.
Output:	Normally closed
Switching voltage:	60 V AC
Switching current:	0.25 A
Switching capacity (resistive):	3 VA
Resistance:	30 Ω at 5 V DC
Switching angle:	20° ±10°

1.2.2 Mercury-free Tilt Sensors CB-39NME and SS-43NME

Enclosure:	CB-39NM: Cast iron, nickel plated SS-43NM: Stainless steel
Protection degree:	IP 68

Cable length:	8 m* * Custom cable length is available upon request.
Output:	Analogue output; to be connected to a control unit
Vertical position:	Appr. 18 mA
Tilted position:	Appr. 8 mA
Supply shorted:	Appr. 26 mA
Supply failure (circuit open):	0 mA
Switching angle:	20° ±10°

1.2.3 Mercury Tilt Switches **CB-39** and **SS-43**

Enclosure:	CB-39NM: Cast iron, nickel plated SS-43NM: Stainless steel
Protection degree:	IP 68
Cable length:	8 m* * Custom cable length is available upon request.
Output:	Normally closed
Switching voltage:	120 V AC
Switching current:	12.5 A
Switching capacity (resistive):	1500 VA
Resistance:	5 Ω
Switching angle:	35° ±10°

1.2.4 Mercury Tilt Switches **CB-39A** and **SS-43A**

Enclosure:	CB-39NM: Cast iron, nickel plated SS-43NM: Stainless steel
Protection degree:	IP 68
Cable length:	8 m* * Custom cable length is available upon request.
Output:	Normally closed
Switching voltage:	120 V AC
Switching current:	12.5 A
Switching capacity (resistive):	1500 VA
Resistance:	5 Ω
Switching angle:	20° ±10°

1.2.5 Mercury Tilt Sensors **CB-39E** and **SS-43E**

Enclosure:	CB-39NM: Cast iron, nickel plated SS-43NM: Stainless steel
Protection degree:	IP 68
Cable length:	8 m* * Custom cable length is available upon request.

Output:	Analogue output; to be connected to a control unit
Vertical position:	Appr. 18 mA
Tilted position:	Appr. 8 mA
Supply shorted:	Appr. 26 mA
Supply failure (circuit open):	0 mA
Switching angle:	35° ±10°

1.2.6 Mercury Tilt Sensors CB-39AE and SS-43AE

Enclosure:	CB-39NM: Cast iron, nickel plated SS-43NM: Stainless steel
Protection degree:	IP 68
Cable length:	8 m* * Custom cable length is available upon request.
Output:	Analogue output; to be connected to a control unit
Vertical position:	Appr. 18 mA
Tilted position:	Appr. 8 mA
Supply shorted:	Appr. 26 mA
Supply failure (circuit open):	0 mA
Switching angle:	20° ±10°

1.3 Certifications

KBT Europe tilt switches/sensors are in conformity with the following standards:

- EN 60947-1 : 2007/A1 : 2011/A2 : 2014
- EN 60947-3 : 2009/A1 : 2012/A2 : 2015
- EN 60204-1 : 2006/A1 : 2009
- EN 60529 : 1991/A1 : 2000/A2 : 2013
- CE
- EAC

1.4 Options

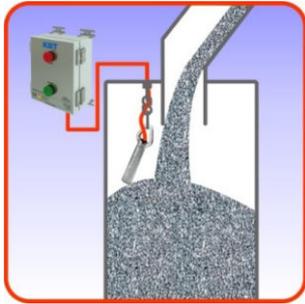
HT option:	High temperature version; -40 °C ... +180 °C
C1 option:	Cable protection with braided stainless-steel conduit
C2 option:	Cable protection with flexible steel tube
X option:	ATEX Zone 21/22 certification for hazardous locations
Ordering example:	SS-43NME-HT-C2

1.5 Optional Extensions

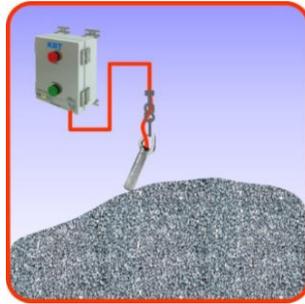
BF extension:	Ball float
EP extension:	Extension plate
WP extension:	Wear probe

CP extension: Cross paddle
Ordering example: SS-43NME-HT-C2-CP

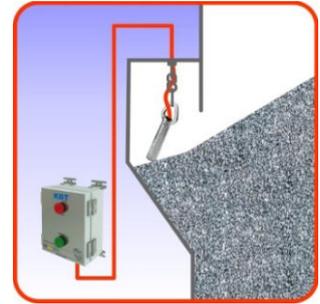
1.6 Typical Applications



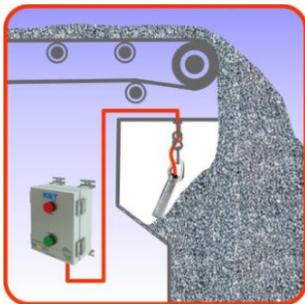
High Level



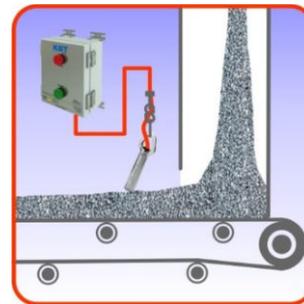
High Pile



Low Level

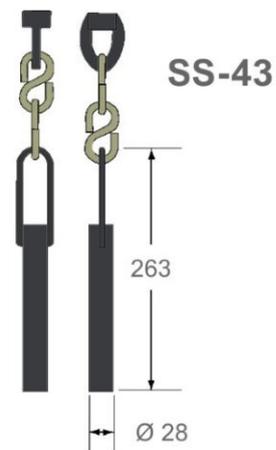
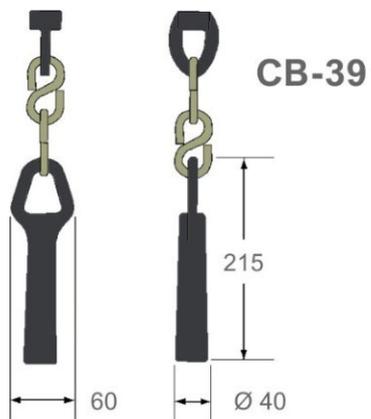


Plugged Chute



Material Flow

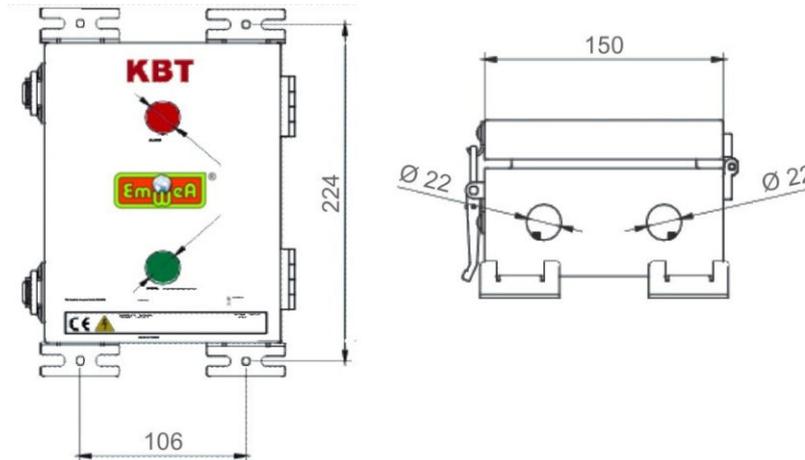
1.7 Probe Dimensions



2 Control Units

2.1 Control Units KT-30F, KT-30FS, and KT-32F

2.1.1 Dimensions

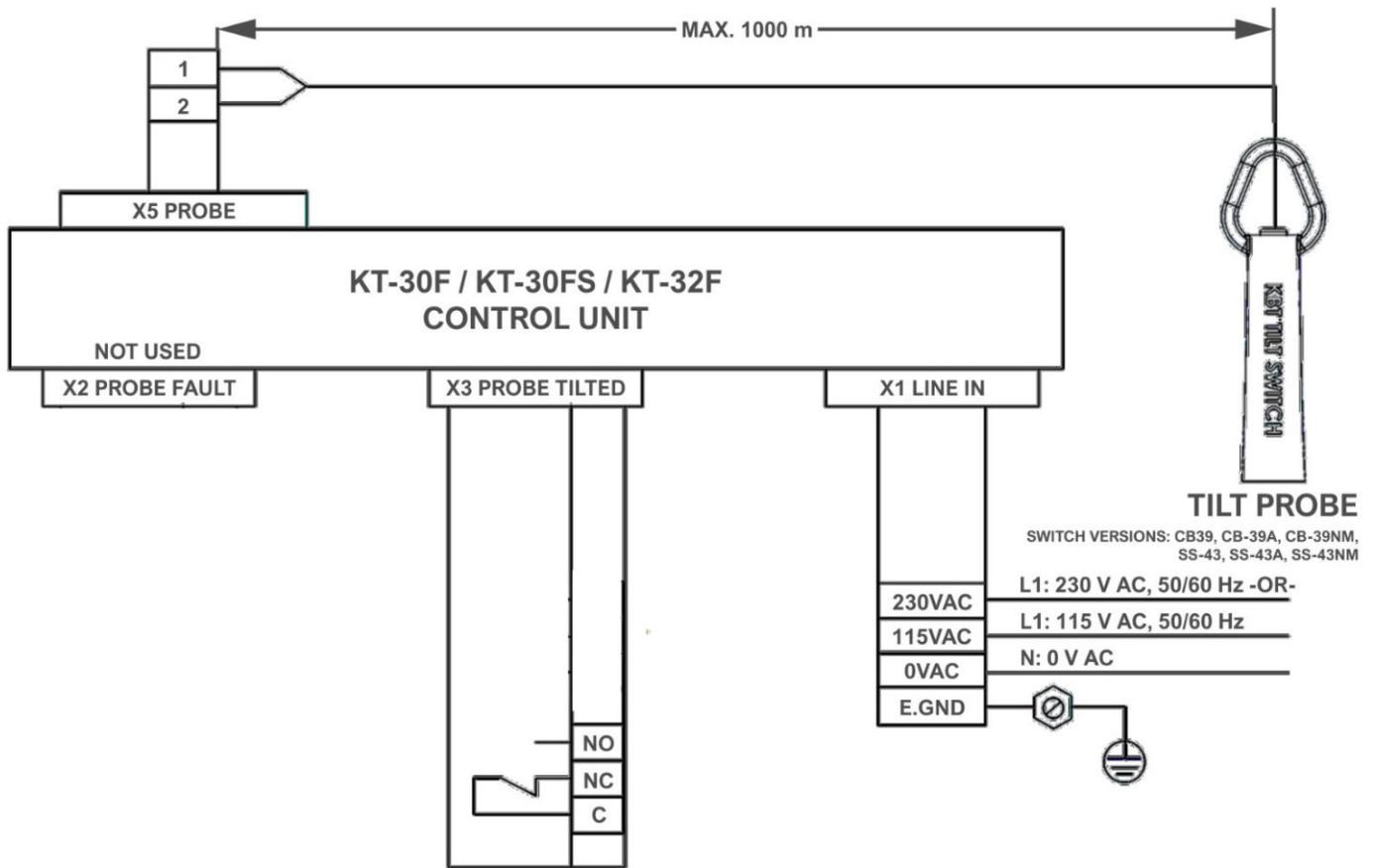


2.1.2 Installation

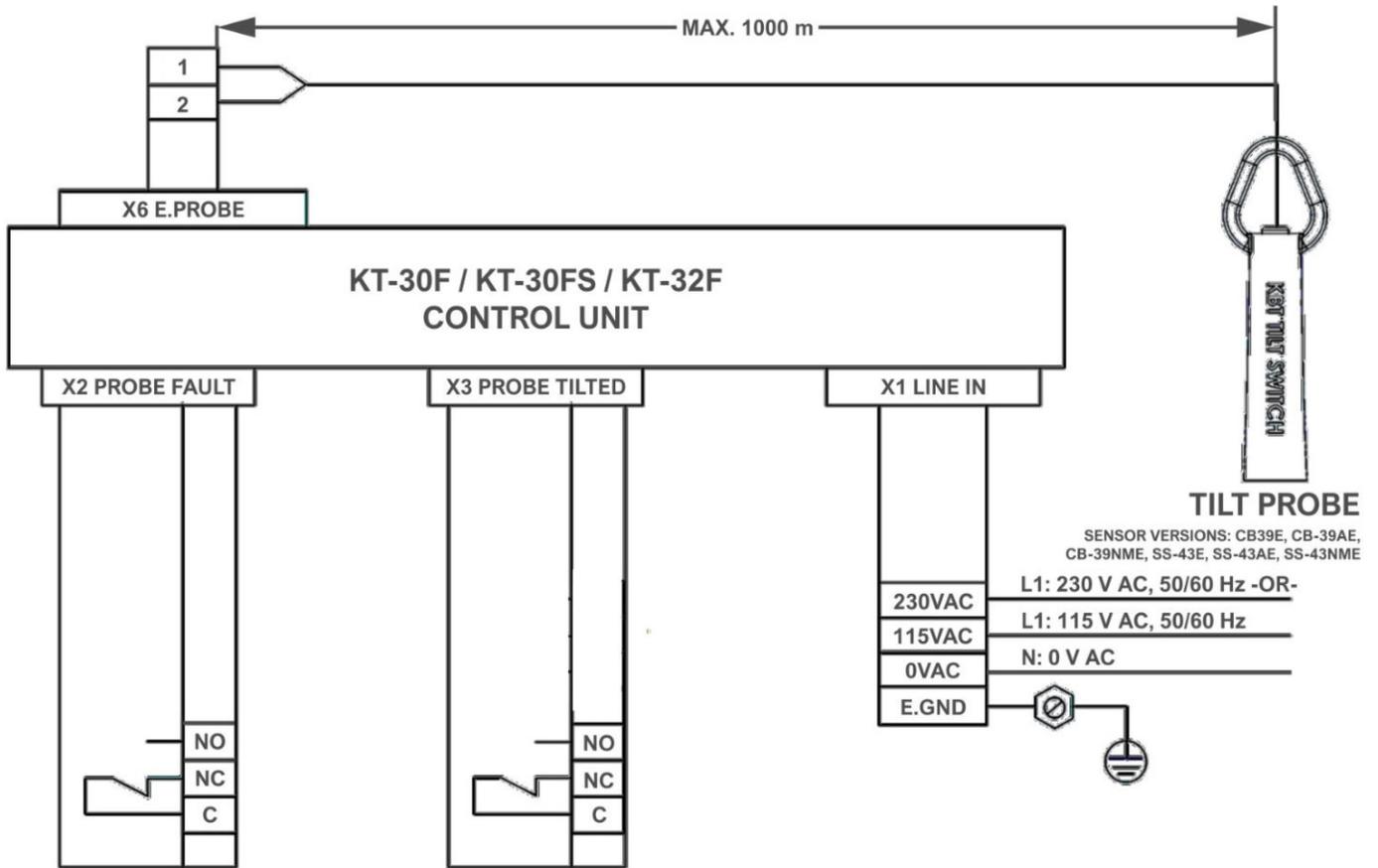
KT3x-F control units may only be installed by qualified personnel in compliance with safety standards. The power must be turned off before wiring. The control unit must not be used in an explosive atmosphere. After wiring, check the installation according to safety standards. The control unit should be mounted in a vibration-free, cool, and dry place.

- The device has two holes on the bottom for M20 or PG16 cable glands.
- Use separate cable glands for probe and power supply.
- The terminals are suitable for flexible wires of max. 12 AWG (4 mm²).

2.1.3 Wiring Diagram Tilt Switches CB39, CB-39A, CB-39NM, SS-43, SS-43A, SS-43NM

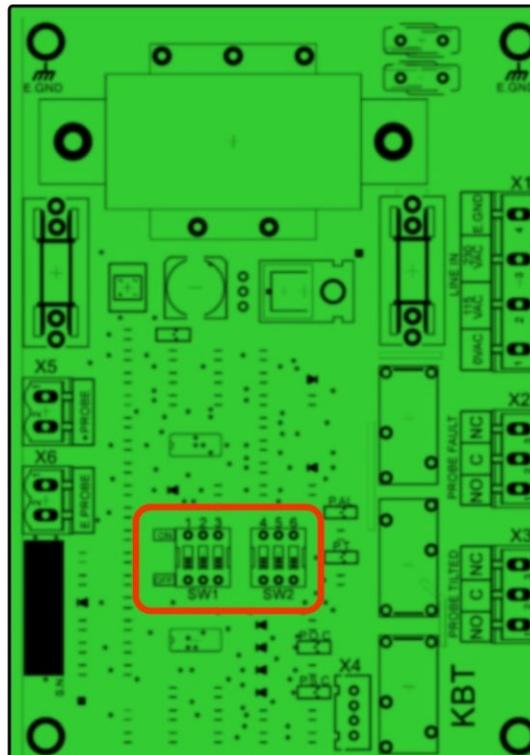


2.1.4 Wiring Diagram Tilt Sensors CB39E, CB-39AE, CB-39NME, SS-43E, SS-43AE, and SS-43NME



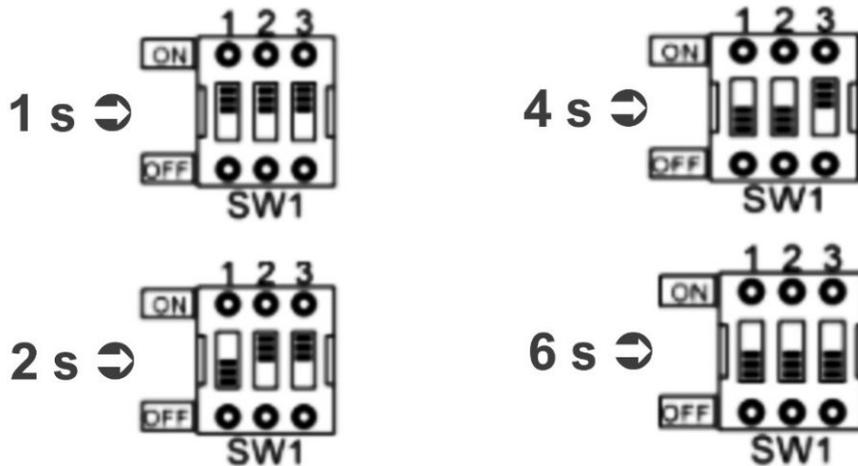
2.1.5 Settings

The control unit settings are made via switches SW1 and SW2 on the main board:



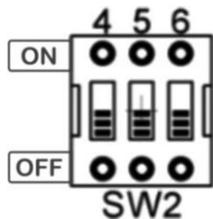
2.1.5.1 Delay Time

The settings on switch SW1 are used to delay the alarm condition. This can prevent alarms caused by short-term movements of the probe.



2.1.5.2 Functionality

The following function settings must be made on switch SW2.



SW2-4 – Sensitivity adjustment

OFF: normal (level applications)
ON: sensitive (material flow applications)

SW2-5 – Alarm reversal

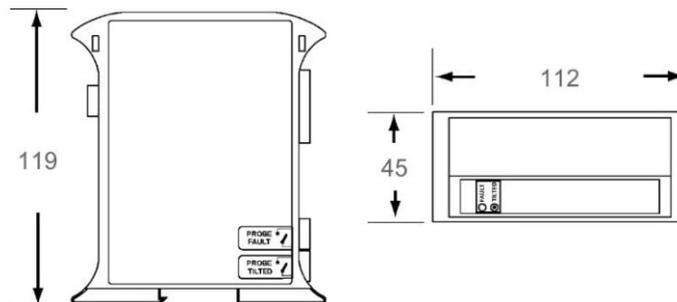
OFF: vertical is normal (standard)
ON: tilted is normal (low level)

SW2-6 – Selection of probe type

OFF: tilt sensor (CB39E, CB-39AE, CB-39NME, SS-43E, SS-43AE, SS-43NME)
ON: tilt switch (CB39, CB-39A, CB-39NM, SS-43, SS-43A, SS-43NM)

2.2 DIN Control Unit KT35-DIN

2.2.1 Dimensions

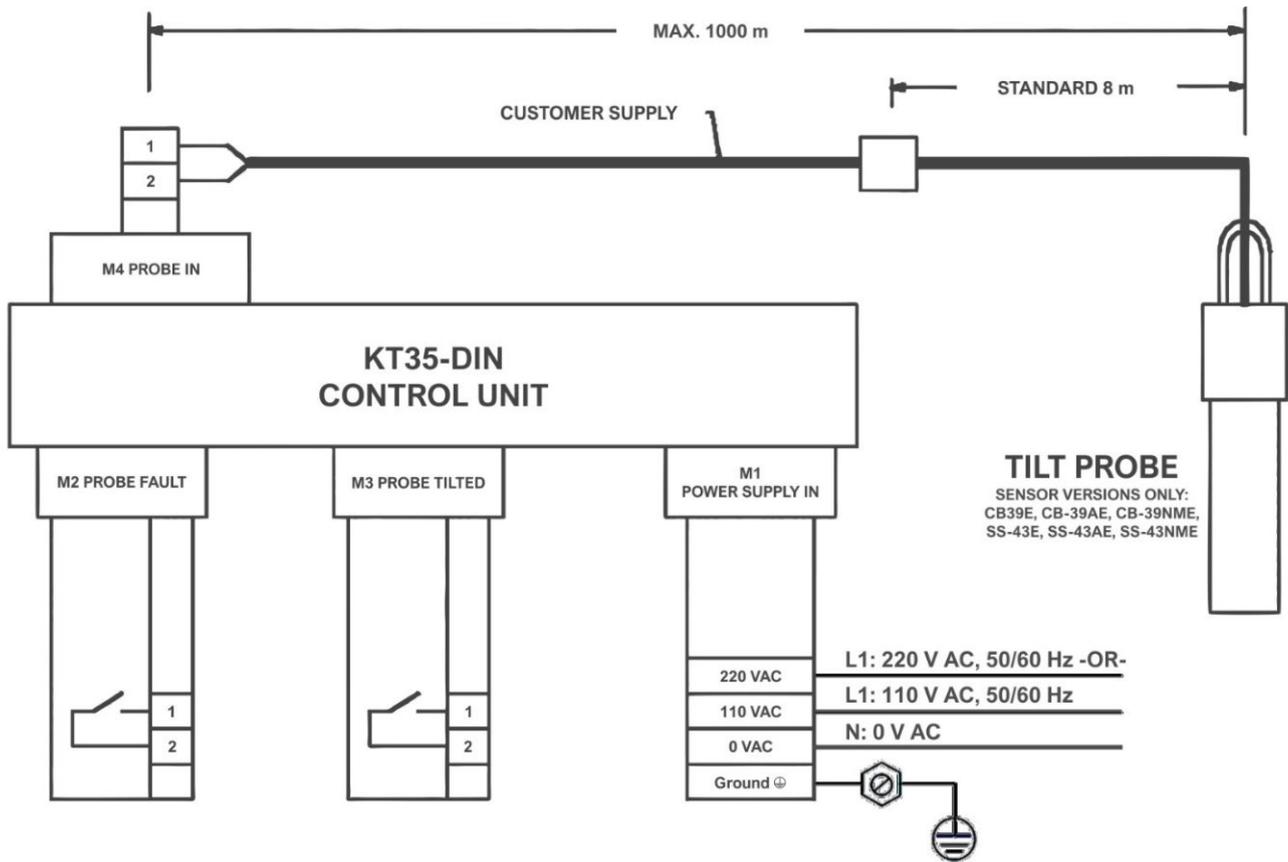


2.2.2 Installation

The KT35-DIN control unit may only be installed by qualified personnel in compliance with safety standards. The power must be turned off before wiring. The control unit must not be used in an explosive atmosphere. After wiring, check the installation according to safety standards. The control unit should be mounted in a vibration-free, cool, and dry place.

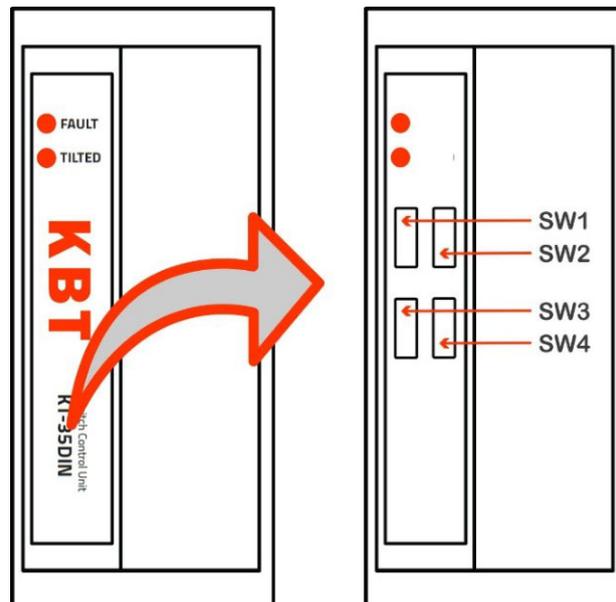
- The unit has labeled terminals on it for connections.
- Use separate cable glands for probe and power supply.
- The terminals are suitable for flexible wires of max. 12 AWG (4 mm²).

2.2.3 Wiring Diagram Tilt Sensors CB39E, CB-39AE, CB-39NME, SS-43E, SS-43AE, and SS-43NME



2.2.4 Settings

The control unit settings are made using switches SW1 to SW4. Lift off the cover on the top of the controller to access these switches:



2.2.4.1 Delay Time

The settings on switches SW1 and SW2 are used to delay the alarm condition. This can prevent alarms caused by short-term movements of the probe.

Delay time		
SW1	SW2	Delay (s)
B	B	1
A	B	2
B	A	4
A	A	6

2.2.4.2 Functionality

The following function settings must be made on switches SW3 and SW4.

Sensitivity adjustment	
SW3	Mode
A	sensitive (material flow applications)
B	normal (level applications)

Alarm reversal	
SW4	Mode
A	vertical is normal (standard)
B	tilted is normal (low level)

3 Important Instructions

Tilt switches and tilt sensors may only be installed by qualified personnel in compliance with safety standards. Before wiring, the power supply to the switch or sensor must be disconnected. The tilt switch or tilt sensor must not be used in an explosive atmosphere unless it has been optionally certified for this purpose. Check the wiring according to safety standards.

- The tilt switch/sensor must be suspended from a vibration-free, rigid mount.
- The tilt switch/sensor must be installed in a vertical position and must be able to move freely.
- The tilt switch/sensor must be located out of the path of falling material.
- Choose the position of the tilt switch/sensor according to your application. Choosing the correct position is important to avoid burying the tilt switch/sensor under bulk material.
- In harsh environmental conditions, prefer a protected installation to protect the cable and probe from damage.
- For fine or light bulk materials, prefer probe extensions to prevent the tilt switch/sensor from being buried.
- After securing the tilt switch/sensor in place, connect the cables to the control unit or your own PLC.
- The switch is normally closed in a vertical position and opens when triggered.

4 Revision history

Version number	Date	Remarks
V01.00	2023-09-05	Creation.
V01.01	2023-12-07	Wiring diagrams corrected; settings revised.



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