PRODUCT INFORMATION

MBA200

Level Indicator with Rotating Paddle for Bulk Materials

SICK
Sensor Intelligence.

MBA200: Measuring the level of bulk better in many ways

For more than 40 years, SICK's rotating paddle level indicators have proven to be robust, safe and reliable. Now,

By choosing the MBA200, you have opted for greater optimization of time and cost efficiency. The individual components of this modular system can be selected to build differentiated solutions for your individual applications. The variants part list is clearly structured for easy and error free selection. Very important are the many precise details that make the MBA200 a reliable and durable level indicator.

The MBA200 functions as a full, demand or empty indicator of bulk products in large storage silos as well as in small containers. In drop tubes and conveyor systems, the indicator provides a quick signal to indicate a blockage in product flow. One of the great features of the MBA200 is high reliability under most difficult operating conditions.

Established measuring principle: the rotating paddle

A synchronous motor slowly rotates the paddle wheel. When the level of bulk material reaches the paddle, the rotating motion is blocked. The counter torque is used to turn the motor mechanics against a switch which shuts off the motor. This condition is electronically transmitted with a relay switch contact.

Using a spring mechanism, the motor mechanics is returned to it's operational position as soon as the rotating paddle is freed from the bulk material. The switch is released and the paddle begins to rotate again.

Installing the MBA200 for your application

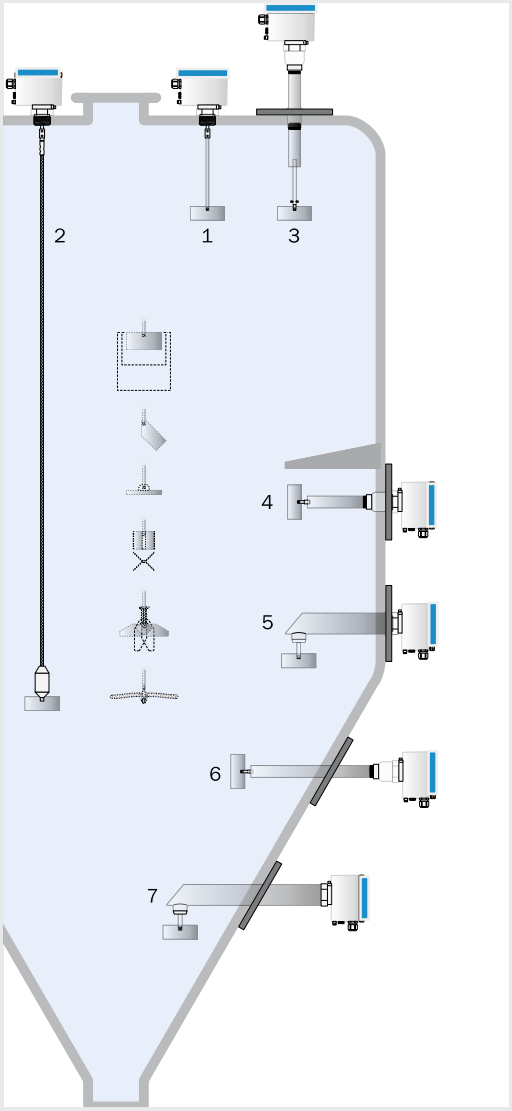
Typical Application

- As full, demand or empty indicator in silos or storage containers
- As a blockage indicator in drop tubes
- As a full indicator during filling operations

For bulk materials, such as ...

Granulate, smectite, detergents, wood chips, fly ash, polyester, casting sand, salt, wood dust, gypsum, sludge, powder, lime, talcum, pellets, charcoal, feedstock, instant foods, PVC, soap powder, coal, sludge, barley, clinker, coal dust, marble dust, spices, quartz dust, coffee, quartz sand, cocoa, sinter chips, corn, stones, malt, dry mortar, flour, cement, milk powder, rape, rice, rye, soy, beans, soybeans, starch, wheat, sugar, etc.

Montagebeispiele
Possible installations



Nine good reasons to choose the MBA200

1 It's all in the motor

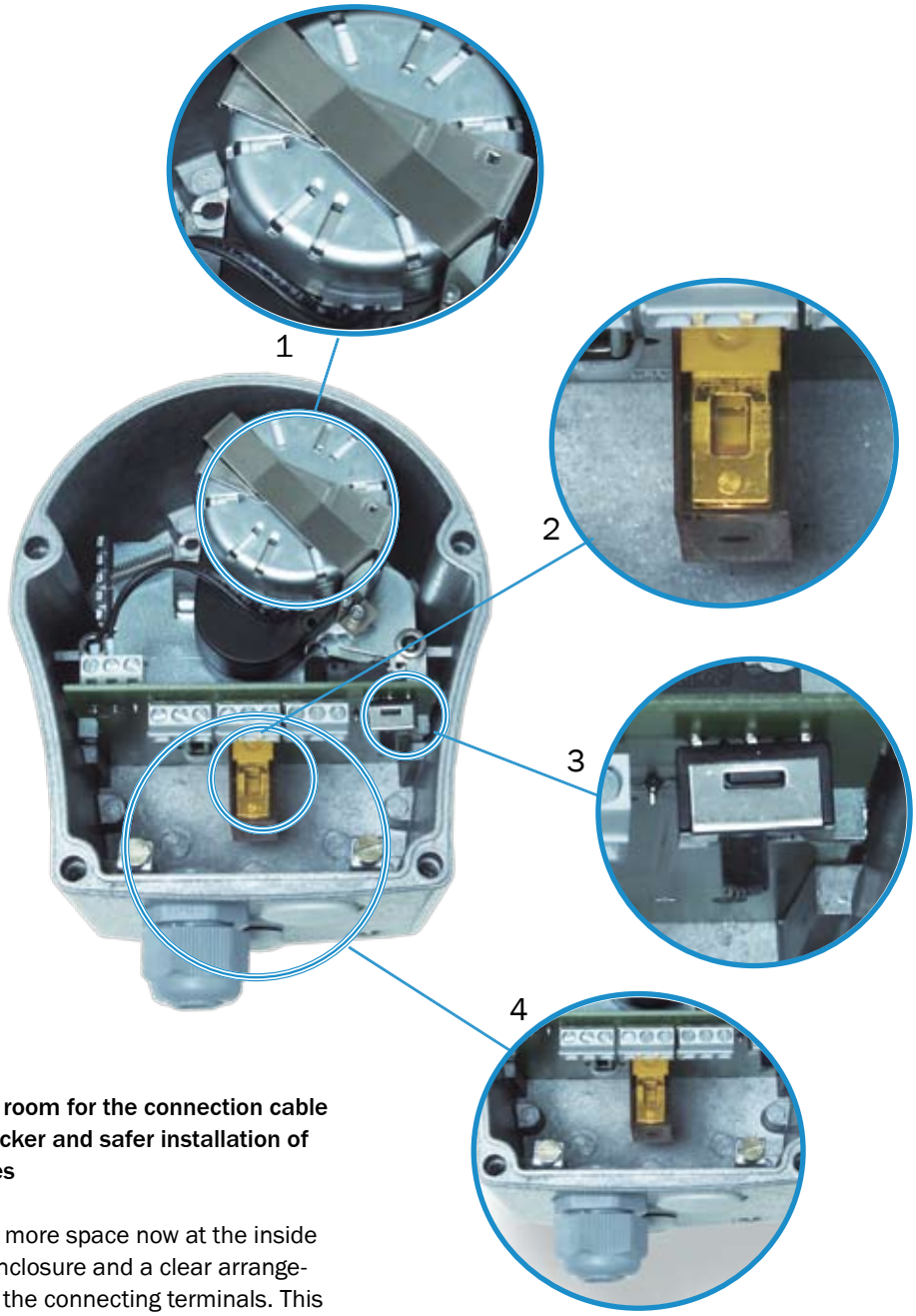
A hard-wearing AC motor is built into every MBA200, offering high performance and excellent reliability. For versions designed to operate with DC power, a built-in inverter is included to control correct supply to the motor. What's more: If the paddle is stopped, the motor is automatically switched off. That means, no energy consumption and no load when the unit is at standstill.

2 Gold contacts – high quality for low signals

Highest voltage and highest current are important parameters for switch contacts. However, low signals need to be switched just as safely. That is why each MBA200 signal relay has gold-plated switch contacts. That makes the MBA200 a highly reliable instrument, an ideal partner for digital control instruments, e.g. with PLCs.

3 Safety-orientated switching – stops malfunctions immediately

Each MBA200 can be easily set to work as an empty or full indicator. Depending on the set-up, the unit will indicate "full" or "empty" in the event of a power failure. For example: operating as a full indicator, the MBA200 will immediately signal "full" if the power cable is cut or power supply fails: This safety function prevents a silo overflow.



4 More room for the connection cable – quicker and safer installation of cables

There is more space now at the inside of the enclosure and a clear arrangement of the connecting terminals. This provides easy and safe electrical connection, even for very difficult mounting locations.

5 The plug-in instrument head makes replacement a simple job

The instrument head is easily separated from the process connection for repair or replacement. The mounting connection on the silo is thereby not affected and the silo remains closed. The instruments head is just as easily remounted.

6 Safe switching by using delayed switching – no fluttering of relays

The versions MBA220 and 230 contain a on/off delay switch. By activating this switch, faulty signal that are caused by falling or swirling around bulk material, hitting the paddle, are prevented. That means, that the switch signal will only be given out when the vessel is actually "full" or "empty". In other words: You will receive always the correct signal.

7 Increased safety due to self-monitoring

To increase the stability of your operation, you have the option to equip the models MBA220 and 230 with a monitoring logic for the shaft rotation. When the shaft stops, although it should be rotating according to the inbuilt switch status, a fault signal is given out. This also happens when the opposite case occurs. In this way the MBA200 is continuously monitoring it‘s own functions.

8 Stainless bearings – reliable operation after a long standstill

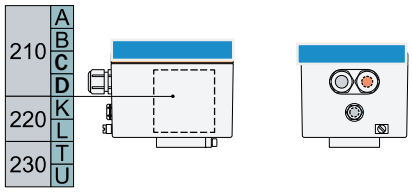
As long as the product covers the paddle, the MBA200 remains shut off. This condition can exist for a long time – e.g. with demand or empty indicators. Even after standstill of over several months, the shaft must immediately rotate as soon as the paddle has been freed. Therefore, each MBA200 is equipped with ball bearings that are made of high quality, corrosion-resistant, stainless steel. What’s more: the instrument versions for high temperatures are designed with a hybrid bearing, containing ceramic balls or a special PTFE sealing.

9 Simplifiying the changeover to the next generation

Replacement of older style MBA level indicators are easy to carry out with the new MBA200. Power supply, process connection, process temperature and pressure – everything can be configured to fit the existing installa-tion.

Selection guide

Electronic selection			
Instrument type	**MBA210**	**MBA220**	**MBA230**
Control	Electromechanical	Microcontroller	Microcontroller
Power supply	230 V 50/60 Hz 115 V 50/60 Hz	24 V AC/DC	42, 115, 230 V; 50/60 Hz
Safety-orientated switching	Yes	Yes	Yes
On/off switching delay	No	Yes	Yes
Operation monitoring	No	Optional	Optional
Heater	No	Optional	Optional
Indicator light	No	Optional	Optional



Selection of the connecting parts						
Extension shaft						
Type	**Installation**[1]	**Application**[1]	**Material**	**Max. immersion depth**	**Max. temperature**	**Product code, see p. 11**
Rigid shaft	Vertical from the top	Full indicator	Stainless steel	3.28 ft	932 °F [2]	**A**
Flexible shaft	Vertical from the top	Full, demand and empty indicator	Stainless steel	49.21 ft	932 °F [2]	**D, E**
Shaft in protective tube	Vertical from the top	Full, demand and empty indicator	Stainless steel or steel	13.12 ft	1472 °F [2]	**B, C, T**
Shaft in protective tube with bearing	Horizontal, lateral (also with angled flange)	Full, demand and empty indicator	Stainless steel or steel	2.13 ft	662 °F [3]	**H, I**
Angled arm shaft	Horizontal, lateral (also with angled flange)	Full, demand and empty indicator	Stainless steel or steel	2.13 ft	662 °F [3]	**K, L** **M, N**

[1] Recommended installation and application. In individual cases, special versions may be possible.
[2] Maximum temperature with sst connecting parts and DTR bearings
[3] Maximum temperature with sst connecting parts and hybrid ball bearings, DHY

Rigid shafts

Rigid shafts are suitable for use in applications where the shaft is not subject to any great lateral stress. Short shafts can (as opposed to the table above) also be used for lateral, horizontal or angled installations as long as the bulk materials doesn't bend the shaft.

- Immersion depth in inch (mm): 4.13 (105) / 4.72 (120) / 5.91 (150) / 6.29 (160) / 7.87 (200)/ 9.84 (250) / 11.81 (300) ... 39.37 (1,000)
- Stainless steel **A**

Shafts in protective tube with bearing

Shafts in protective tubes with a bearing are used for horizontal or angled lateral installations. The bearing centers and supports the shaft inside of the protective tube and seals the tube against dust ingress.

- Immersion depth in inch (mm): 6.29 (160) / 7.87 (200) / 9.84 (250) / 11.81 (300) ... 25.59 (650)
- Steel **H**
- Stainless steel **I**

Shafts in protective tube

Shafts mounted in protective tubes (without a bearing) are used for vertical installations from the top. The protective tube offers additional protection from lateral forces or impacts from bulk material. Also, pulling forces which occur through friction of the product when the silo is emptied are diverted by the protective tube.

- Immersion depth in inch (mm) 11.81 (300) / 15.74 (400) / 19.68 (500) ... 157.48 (4,000)
- Steel **B**
- Stainless steel **C, T**

Shafts in an angled arm

Shafts in an angled arm are protected with a very rugged steel tube. The paddle is mounted at a 90° angle down and therefore is best designed for horizontal or lateral installations. The angled arm can also be installed in flowing product e.g. as a tailback (jam) indicator.

- Immersion depth in inch (mm): 3.34 (85) / 9.84 (250) / 11.81 (300) / 13.78 (350) ... 25.59 (650)
- Steel **K**
- Stainless steel **L**

Flexible shafts

The flexible shaft consists of an 0.31 or 0.47 inch rugged steel cable. The advantage of a flexible shaft: There is no continuous bending via lateral stress through movement in the bulk product or when the bulk material hits the steel cord and the paddle wheel. If the silo is empty, the steel cord is tightened with a tightening weight.

- Immersion depth in inch (mm): 11.81 (300) / 15.74 (400) / 19.68 (500) ... 590.55 (15,000)
- Ø 0.31 in (8 mm) stainless steel **D**
- Ø 0.47 in (12 mm) stainless steel **E**

Reinforced arm

- Immersion depth in inch (mm): 9.84 (250) / 13.78 (350) / 17.71 (450) / 23.62 (600)
- Steel **M**
- Stainless steel **N**

Paddle selection and data for process conditions

Paddle selection			
Version	**Application**		**Product Code (see p. 11)**
Rectangular 3.7 x 1.6 inches	Rugged, standard paddle used for most applications		**A**
Rectangular 3.9 x 3.9 inches 7.9 x 3.9 inches	Paddle with a larger surface, reacts more sensitively. This is used for fine, low density powders or light bulk products		**B, C**
One-sided paddle	Allows the shaft together with the paddle to be inserted into a 1 ½" process connection. Horizontal installation offers the advantage that the weight of the bulk pushes the paddle downwards, thereby taking pressure off the shaft		**D**
Folding paddle	Allows the shaft together with the paddle to be inserted into a 1 ½" process connection. The folded paddle has a larger surface area than the one-sided paddle and is therefore more sensitive		**K**
Stick paddle	For heavy bulk materials e.g. stones		**N**
Rope paddle	For coarse wood chips, also as an empty indicator		**T**
Rubber paddle	For special applications (not shown)		**G**
X-shaped paddle	For quick reaction times in fine powders (not shown)		**R**
Special paddle	Other paddle types are available on request		

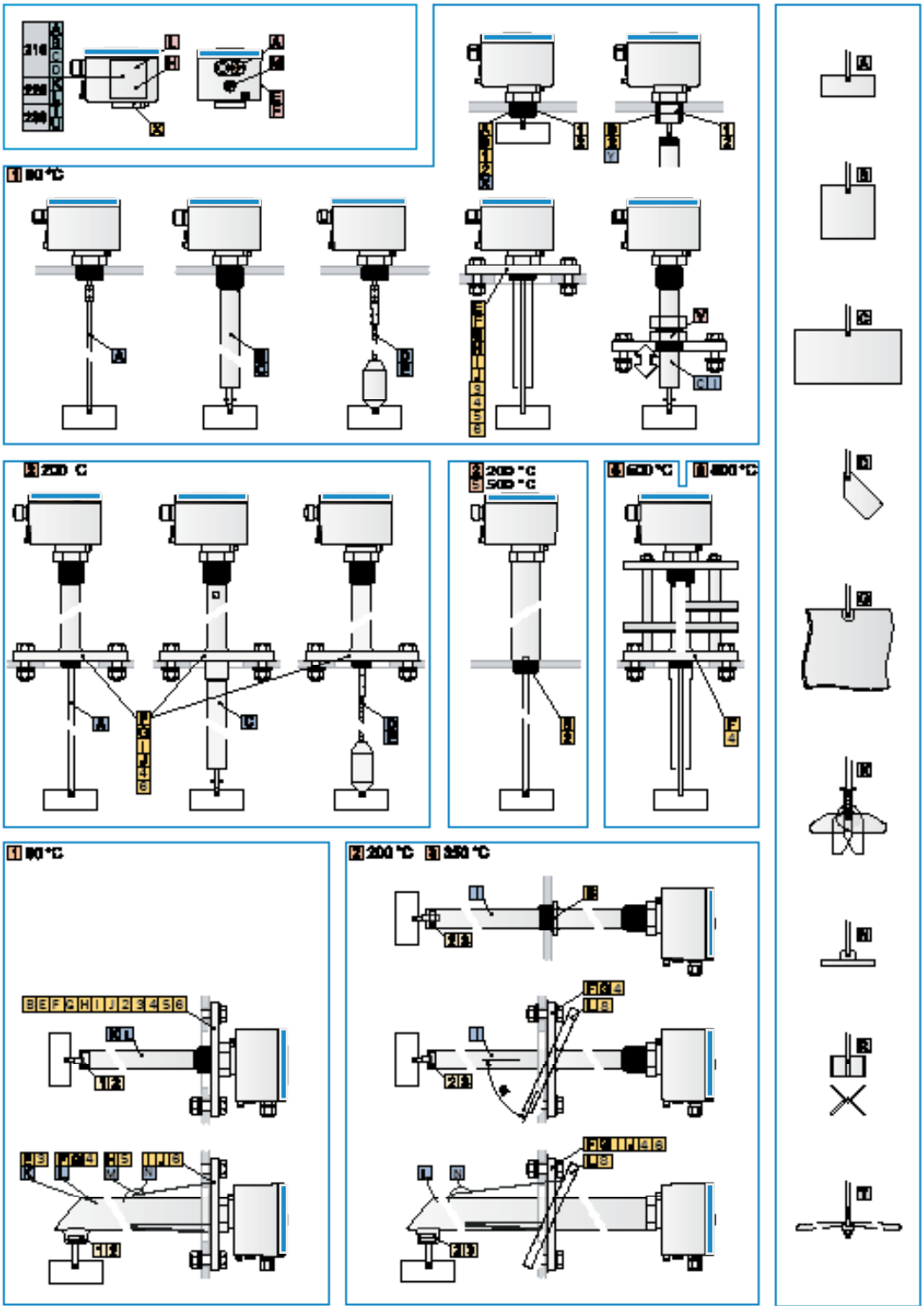
Process conditions		
Version	**Application**	**Product Code (see p. 11)**
Process connection	Thread G 1 ½" / 1 ¼" NPT Flange DN100 PN6 / DN100 PN16 / DN125 PN6 / DN125 PN16 / 4" ANSI Class 150 / 5" ANSI Class 150	**A, B, E, F, G, H, I, J, K, L, M, N, P , 1, 2, 3, ... 0**
Bearings / seals	Stainless steel bearings, rust-proof steel, gas and dust tight DTR-bearing for additional protection against abrasive products	**1, 2, 3**
Process pressure(*)	Up to 3 bar (standard) Up to max. 10 bar (not with dust Ex version)	**N, H**
Process temperature(*)	Up to max. 80 °C (176 °F) (standard) Up to max. 800 °C (1,472 °F) (not with dust Ex version)	**1, 2, 3, 5, 8**

(*) Devices for higher temperature and pressure are limited in their combination possibilities

Technical data			
Instrument type	**MBA210**	**MBA220**	**MBA230**
Power supply	230 V, 50/60 Hz 115 V, 50/60 Hz	24 V AC/DC	42, 115, 230 V, 50/60 Hz
Power consumption	3 VA	3 VA / 10 VA	3 VA / 10 VA
Micro controller	No	Yes	Yes
Safety-orientated switching	Yes	Yes	Yes
On/Off delay	No	4 s	4 s
Operation monitoring	No	Optional	Optional
Switch contacts	one isolated change over contact rating 250 V AC, 2A or 60 V DC, 1A		
Enclosure rating	IP 65		
Material	Cast aluminium		
Ambient temperature	5 ... 140 °F, with heater –22 ... +140 °F		
Dust Ex-certification **Zone 20 /21** **Zone 20 /20**	II ½ D IP 65 T98 °C or T200 °C or T350 °C / T98 °C II 1 D IP65 T98 °C or T200 °C or T350 °C / T98 °C CSA for US and C; cCSAus for Class II, III Div. 1 Gr. E, F, G awaiting certification approval		Type MBA2XX Z ... Type MBA2XX Y ... Type MBA2XX C ...

Options		
Operation monitoring	Electronic monitoring of the level indicator. Signals a fault when a mechanical break occurs between the motor and the paddle shaft. The fault signal is safety switched	**L**
Electrical internal heating	Permits operation even at outdoor temperatures as low as –22 °F	**H**
Display lamp	The lamp is integrated in the enclosure for the display of "full" or "empty"	**A**
Variable height adjustment	Permits the change of limit level at which a full signal is given. This can be adjusted. (suitable for mounting of devices with protective tubes, made of stainless steel)	**V**
Membrane	For climatic exchange between the ambient and enclosure. This prevents condensation inside of the enclosure. Also as a safety balance for pressurized instruments.	**M**
Fast rotating motor	Higher motor speed (5 RPM) shortens the reaction time of the level indicator e.g. during rapid filling	**B, D, L, U**

Product selection



Type	
210	Electromechanics, for power supply [A] [B] [C] [D]
220	Microcontroller, for drive and power supply [K] [L]
230	Microcontroller, for drive and power supply [T] [U]

Certification	
X	Without certification
C	CSA CA and US certification for dust Ex [in preparation]
Z	With ATEX certification for dust explosion hazardous locations zone 20/21
Y	With ATEX certification for dust explosion hazardous locations zone 20/20

Drive	
A	230 V, standard rotation 1/min. (for type MBA210)
B	230 V, fast rotation 5/min. (for type MBA210)
C	115 V, standard rotation 1/min. (for type MBA210)
D	115 V, fast rotation 5/min. (for type MBA210)
K	24 V AC/DC, standard rotation 1/min. (for type MBA220)
L	24 V AC/DC, fast rotation 5/min. (for type MBA220)
T	230 / 115 / 42 V AC, standard rotation 1/min. (for type MBA230)
U	230 / 115 / 42 V AC, fast rotation 5/min. (for type MBA230)

Process connection	Metric	US-version		Material	
X	Unit head without process connection [spare part]				
A	G 1½" thread	1	1 ¼" NPT	Aluminium	With shafts [X] [A] [D] [E], with DT bearing [1]
B	G 1½" thread	2	1 ¼" NPT	Stainless steel	Not with shafts [K] [L] [M] [N] [T]
E	Flange DN 100 PN 6	3	4" ANSI Class 150	Plain steel	Not with shafts [L] [M] [N] [T]
F	Flange DN 100 PN 6	4	4" ANSI Class 150	Stainless steel	Not with shafts [K] [M] [N]
G	Flange DN 100 PN 16	4	4" ANSI Class 150	Stainless steel	Not with shafts [K] [M] [N] [T]
H	Flange DN 125 PN 6	5	5" ANSI Class 150	Plain steel	Not with shafts [K] [L] [N] [T]
I	Flange DN 125 PN 6,	6	5" ANSI Class 150	Stainless steel	Not with shafts [K] [L] [M] [T]
J	Flange DN 125 PN 16	6	5" ANSI Class 150	Stainless steel	Not with shafts [K] [L] [M] [T]
K	Angled flange with spacer, 65°, DN 100 PN 6	7	4" ANSI Class 150	Plain steel	With shaft [K]
L	Angled flange with spacer, 65°, DN 100 PN 6	8	4" ANSI Class 150	Stainless steel	With shafts [I] [L] [I] with DTR/DHY only
M	Angled flange with spacer, 65°, DN 125 PN 6	9	5" ANSI Class 150	Plain steel	With shaft [M]
N	Angled flange with spacer, 65°, DN 125 PN 6	0	5" ANSI Class 150	Stainless steel	With shaft [N]

Bearing/sealing	
1	Ball bearing DT: stainless steel with shaft-sealing ring
2	Ball bearing DTR: stainless steel with PTFE sealing (not with process connection made of aluminium [A]
3	Ball bearing DHY: stainless steel with ceramic balls and Grafiflex sealing; for shaft [I] [L], [N] only suitable for 350 °C (663 °F) [3]

Process pressure	
N	–0.5 ... +3 bar
H	–0.5 ... +10 bar, with process connection [B] [G] [J], [2, 3, ... 0], max. 200 °C (392 °F) [1] [2]

Process temperature	
1	Up to 80 °C (176 °F)
2	Up to 200 °C (392 °F), with stainless steel, with bearing [2]
3	Up to 350 °C (662 °F), with stainless steel, with bearing [3], for horizontal protection tube [I] [L] [N] max. 3 bar [N]
5	Up to 500 °C (932 °F), with flange [F] [4], with bearing [2], for shafts [X] [Y] [A] [C] [D] [E], max. 3 bar [N], not with ATEX certif. [Z] [C] [Y]
8	Up to 800 °C (1472 °F), with flange [F] [4], with bearing [2], special shaft [T], max. 3 bar [N], not with ATEX certification [Z] [C] [Y]

Shaft		Material
X	Short shaft nozzle (paddle and shaft attachable)	
Y	Long shaft nozzle, with inner screw connection [paddle, shaft, protection tube attachable]	Stainless steel[2]
A	Rigid shaft, without protection tube, 105/120/150/160/200/250/300 ... 1,000 mm	Stainless steel
B	Rigid shaft, with protection tube for vertical mounting, 300/400/500 ... 4,000 mm	Plain steel
C	Rigid shaft, with protection tube for vertical mounting, 300/400/500 ... 4,000 mm	Stainless steel [2]
D	Flexible shaft Ø 8 mm, without protection tube, 300 ... 15000 mmm	Stainless steel
E	Flexible shaft Ø 12 mm, without protection tube, 400 ... 15000 mm	Stainless steel
H	Rigid shaft, with protection tube for horizontal mounting [1], 160 mm or 200/250/300 ... 650 mm	Plain steel
I	Rigid shaft, with protection tube for horizontal mounting [1], 160 mm or 200/250/300 ... 650 mm	Stainless steel[2]
K	Angled shaft for horizontal mounting, 85 mm or 250/300 ... 650 mm	Plain steel
L	Angled shaft for horizontal mounting, 85 mm or 250/300 ... 650 mm,	Stainless steel [2]
M	Angled shaft for horizontal mounting, with fins, 250/350/450/600 mm	Plain steel
N	Angled shaft for horizontal mounting, with fins, 250/350/450/600 mm	Stainless steel [2]
T	Special shaft for temp. up to 800 °C, with protection tube, only for vertical mounting, 300/400/500 ... 4,000 mm	Special steel [2]

Immersion depth

0 | 0 | 0 | 0 mm [3]

Paddle		
X	Without paddle	
A	Flat paddle 98 x 40 mm	Stainless steel
B	Flat paddle 98 x 98 mm	Stainless steel
C	Flat paddle 200 x 100 mm	Stainless steel
D	Flat paddle angular on one side, fits through a G1½" hole	Stainless steel
G	Rubber paddle 150 x 150 mm (not suitable for EX-application)	
K	Folding paddle 140 x 35 mm, fits through a G1½" hole	Stainless steel
N	Stick paddle Ø 12 x 100 mm	Stainless steel
R	X–shaped paddle 98 x 40 mm	Stainless steel
T	Rope paddle Ø 10 x 250 mm	Stainless steel

Options (several options possible)	
X	No options
L	Operation monitoring (suitable for type 220 and 230)
H	Heater (suitable for type 220 and 230)
A	Signal lamp at unit head (suitable for type 220 and 230), no Ex certification [Z] [C] [Y]
V	Height adjustment with G1½" thread, vertical protection tube [C] [I], required
E	Unit head eloxation (varnished unit head cover)
F	Unit head, varnished
M	Membrane to protect unit head against condensation

MBA | | | | | | | | | | | | | |

Special versions on request. Subject to changes or further limitations without prior notice.

[1] With additional shaft bearing
[2] Requires process connection made of stainless steel
[3] For some combination immersion depth may deviate from this table

FACTORY AUTOMATION

With its intelligent sensors, safety systems, and auto ident applications, SICK realises comprehensive solutions for factory automation.

- Non-contact detecting, counting, classifying, and positioning of any types of object
- Accident protection and personal safety using sensors, as well as safety software and services

LOGISTICS AUTOMATION

Sensors made by SICK form the basis for automating material flows and the optimisation of sorting and warehousing processes.

- Automated identification with bar code and RFID reading devices for the purpose of sorting and target control in industrial material flow
- Detecting volume, position, and contours of objects and surroundings with laser measurement systems

PROCESS AUTOMATION

Analyzers and Process Instrumentation by SICK MAIHAK provides for the best possible acquisition of environmental and process data.

- Complete systems solutions for gas analysis, dust measurement, flow rate measurement, water analysis or, respectively, liquid analysis, and level measurement as well as other tasks

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