

TK

TECHNICAL GUIDANCE

SONICMAX

UL3030K

3-BEAM Compact Ultrasonic Flowmeter

GENERAL

UL3030 is a universal in-line ultrasonic flowmeter for liquids in use of 3 sets of ultrasonic transducer/receiver.

3-BEAM technology combined with DSP (digital signal processing) enables UL3030K with highly accurate and stable measurement in broad range of application.

UL3030K is maintenance free instrument, can be used regardless physical and chemical property of the liquids such as density, viscosity, conductivity and corrosiveness. **UL3030K** is available for 25 to 2000 mm diameter pipes.

UL3030K is applicable for bi-directional (forward/reverse) flow measurement.

FEATURES

- ❑ **High accuracy**, $\pm 0.5\%$ of reading. 3-ultrasound beam technology achieves highest accuracy from laminar to turbulent flow.
- ❑ **Digital Signal Processing** enhanced stability of measurement and minimized the influence of bubbles and particles.
- ❑ **No intrusive or moving part, maintenance-free.** Optimal replacement of turbine and/or PD flowmeter for oil and solvent flow measurement.
- ❑ **Easy installation** with compact design and variety of outputs including 4 to 20 mA/HART, pulse and status outputs.
- ❑ **Explosion proof** available. ATEX (Europe) and TIIS (Japan)
- ❑ **Wide application range** in industrial process applications. From drinking water, cooling water and DI water to both acids and caustic solutions. Also inorganic substances from molten sulfur to chlorine and organic substances from edible oils to bitumen and LPG.

STANDARD SPECIFICATION

- Measuring method : Time of flight of ultrasound, 3 beams
- Nominal size : 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000 mm
- *Note: Please ask Tokyo Keiso application of pipe size over 2000 mm
- Measuring range : Flow velocity Minimum; 0 to 0.5 m/s
Maximum; 0 to 20 m/s
- *Note: Please refer flow range for [Flow range table]
- Protection class : IP67 (to IEC60529, JIS C0920, equivalent to NEMA6)
- Ambient temperature : -40 to 65 °C
- *Note: Please also refer ambient temperature range in the Explosion proof
- Painting : Polyurethane coated
- Color : Silver
(Jade green only for converter covers)

Sensors

- Wetted part material
Measuring tube : Size 25 to 300 mm; Stainless steel (equivalent to 316 L SS)
Size 350 to 2000 mm; Carbon steel (stainless steel available as option)



- Transducer housing/ : Stainless steel (equivalent to 316 L SS)
- Transducer window
Flange : Size 25 to 65 mm; Stainless steel (equivalent to 316 L SS)
Size 80 to 2000 mm; Carbon steel (stainless steel available as option)
- Body material
Transducer cover : Size 25 to 65 mm; Stainless steel (equivalent to 316 L SS)
Size 80 to 300 mm; Carbon steel
- Transducer housing : Size 350 mm over; Stainless steel cover (equivalent to 316 L SS)
- Process connection : Flange; Equivalent to JIS 10 K/JIS 20 K, ANSI class 150/class 300/class 600/class 900, DIN PN6/PN10/PN16/PN40/PN100

Fluids

- Measuring object : All liquids with maximum solid particle content $< 5\%$ (by volume) or maximum gas content $< 2\%$ (by volume)
- Temperature : -25 to 140 °C
- Pressure : Max. 10MPa, as per flange rating

Converter

- Housing : Aluminum alloy die casting
- Cable entry : ISO G 1/2 female or 1/2 NPT female or M20 water proof gland (G 1/2 water proof gland optional)
- Power supply : 100 to 240 V AC +10/-15% 48-63 Hz 24 V DC (18 to 35 V)
- Power consumption : Approx. 10 VA (AC), 10 W (DC)
- Grounding : Grounding resistance ≤ 100 Ω for non Ex type Grounding resistance ≤ 10 Ω for Ex type
- Display : 2 lines LCD (illuminated) 1st line; 7 digits measured value 2nd line; unit
 Indication : Continuous display of flow rate, total flow, sound velocity or alternating display of selected items
 Flow rate units : Volume flow rate in m³, barrels, liters, US gallons or user defined volume unit per hour, minute, second, or user defined time unit or % FS (Standard setting: Flow rate)
 Total flow units : Volume unit same as flow rate, (forward, reverse or sum totals) Sound velocity unit: m/s (liquid sound velocity)

● Output

Current : 4 to 20 mA DC, 0 to 20 mA or user defined scale
 Active output; Max. load 680 Ω
 Passive output; 18 to 24 V DC supply (external)
 Explosion proof type; Only with passive output

Pulse/Frequency/Status output:

Pulse, frequency or status output selectable at P terminal

Open collector output

Contact rating; Max. 19 to 32 V DC, Max. 150 mA

Pulse output;

Pulse rate at full scale;

1 to 7,200,000 pulse/h (0.00028 to 2000 Hz)

Pulse width;

Pulse rate < 10 Hz ; 25, 50 100, 200 or 500 ms

Pulse rate ≥ 10 Hz ; Duty ratio 1:1

Status output;

Select one from the following

- 1) No status output (standard setting)
- 2) Flow direction (forward/reverse)
- 3) Range over
- 4) Max. or Min. flow rate alarm
- 5) Total flow full count (Batch counter)
- 6) Signal (ultrasound) error

Frequency output;

Freely assign to flow rate, velocity of sound transducer signal gain (dB) or analog input 1 or 2

● Input

Control input;

Voltage input (Can not be used when Current output is used)

Low ; 0 to 5 V DC, High ; 15 to 32 V DC

Selectable from following

- 1) No control input used (standard)
- 2) Reset total flow counter
- 3) Acknowledge "error"
- 4) Force output to zero
- 5) Initiate batch

Analog input (option);

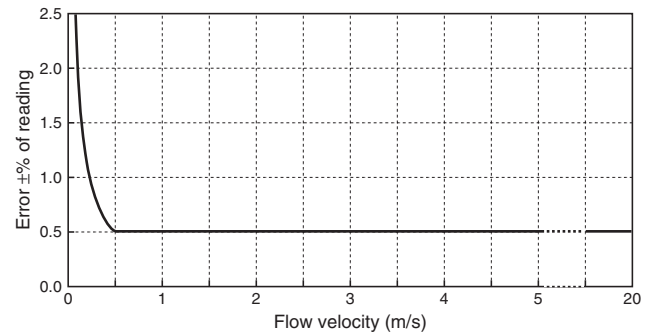
Analog input 1; Temperature (4 to 20 mA)

Analog input 2; Pressure (4 to 20 mA)

- HART communication : Equipped as standard
- Time constant
 For current output and display:
 0.025 to 99.999 s (set in 0.001, 0.1, 1 s increment)
 For pulse or frequency output:
 25 ms or same as current output and display
- Low flow cut-off : Cut-off active value 1-19%
 Cut-off de-active value 2-20%
 Programmable in increments of 1%
- Forward/Reverse flow : Available in status output (if selected) detection
- Self-diagnosis : Display flashing and error message appears when Internal error, A/D converter error, wrong setting, range over, total flow counter overflow, empty tube detection occurred
- Data save function : EEPROM keeps all the set data and Total flow counter 10 years after power fail
- Testing function : Output loop check is able without calibrator
 Current output : 0, 4, 10, 20, 22 mA
 Pulse/frequency output : 1, 10, 100, 1000, 2000 Hz
- Magnetic switch : Parameter set is able without opening cover by magnetic switch

Accuracy (under reference condition)

- Display and pulse/frequency output
 ±0.5% of reading when flow velocity is ≥ 0.5 m/s
 Flow velocity error : ±0.0025 m/s when flow velocity is < 0.5 m/s



Reference condition

- Fluid : Water
- Fluid temperature : 10 to 30 °C
- Ambient temperature : 20 to 22 °C
- Supply voltage : ±2% of nominal voltage
- Straight run : 10 D (up stream), 5 D (downstream)
- Measuring time : 100 s

- Current output accuracy : Add ±0.01 mA to corresponding current output of display and pulse/frequency output flow rate
- Influence of temperature : < ±0.1% per 10 °C

Explosion proof

- ATEX [EU ATEX directive (94/9/EC)]

PTB 03 ATEX2101 X

Ta: Ambient temperature

Nominal size	25...3000 mm		
Ex class	II 2G EEx d [ib] IIC T6...T3		
Temperature class	Fluid temperature		
	-40 ≤ Ta ≤ +40°C	-40 ≤ Ta ≤ +50°C	-40 ≤ Ta ≤ +60°C
T6	-25 to +80°C	-25 to +80°C	-25 to +70°C
T5	-25 to +95°C	-25 to +95°C	-25 to +95°C
T4	-25 to +130°C	-25 to +130°C	-25 to +125°C
T3	-25 to +140°C	-25 to +140°C	-25 to +125°C

- TIIS [Japan] : Pending

FLOW RANGE

Nominal size (mm)	Possible setting range (m³/h)	
	Min.	Max.
25	0 to 0.89	0 to 35.3
32	0 to 1.45	0 to 57.9
40	0 to 2.27	0 to 90.4
50	0 to 3.54	0 to 141
65	0 to 5.98	0 to 238
80	0 to 9.05	0 to 361
100	0 to 14.2	0 to 565
125	0 to 22.1	0 to 883
150	0 to 31.9	0 to 1272
200	0 to 56.6	0 to 2261
250	0 to 88.4	0 to 3534
300	0 to 128	0 to 5089
350	0 to 174	0 to 6927
400	0 to 227	0 to 9047
500	0 to 354	0 to 14137
600	0 to 509	0 to 20357
700	0 to 693	0 to 27708
800	0 to 905	0 to 36191
900	0 to 1146	0 to 45804
1000	0 to 1414	0 to 56548
1200	0 to 2036	0 to 81430
1400	0 to 2771	0 to 110835
1600	0 to 3620	0 to 144764
1800	0 to 4581	0 to 183217
2000	0 to 5655	0 to 226194

(Flow velocity span : 0.5 to 20 m/s)

ACCESSORIES

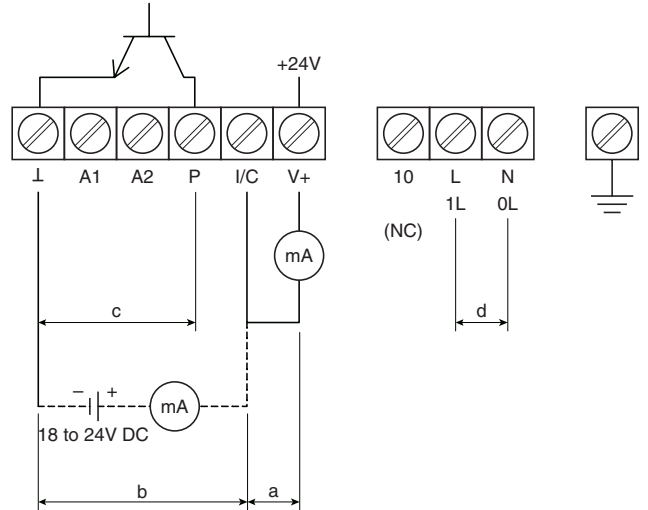
- Cover opener : 1
- Magnet bar for data setting : 1
- Set parameter sheet : 1
- Instruction operation manual : 1

OPTION

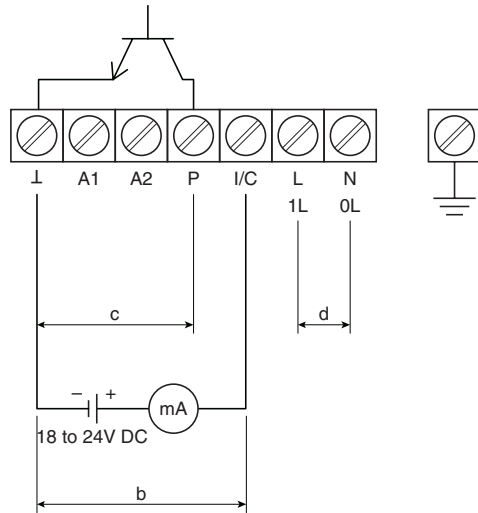
- Water proof cable gland size G1/2 [code: WG]
- Without parameter setting [code: NS]
Deliver with default setting. Customers are requested to set application parameters such as flow range.

WIRING

- Non Ex type



- Ex type

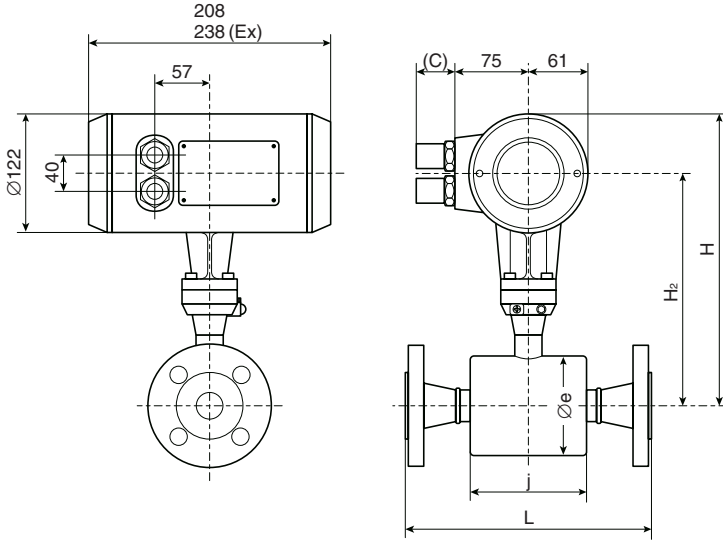


Symbol	Terminal	Polarity	Description
a	V+	+	Current output (4 to 20 mA DC or other) or Control input [Internal power source] * Only for Non Ex type
	I/C	-	
b	I/C	+	Current output (4 to 20 mA DC or other) or Control input [External power source : 18 to 24V DC]
	J	-	
c	P	+	Pulse output, Frequency output or Status output (Open collector)
	J	-	
d	L	/	AC Power supply
	N		
	1L	+	DC Power supply
	0L	-	
-	A1	+	Optional terminals
	A2	+	

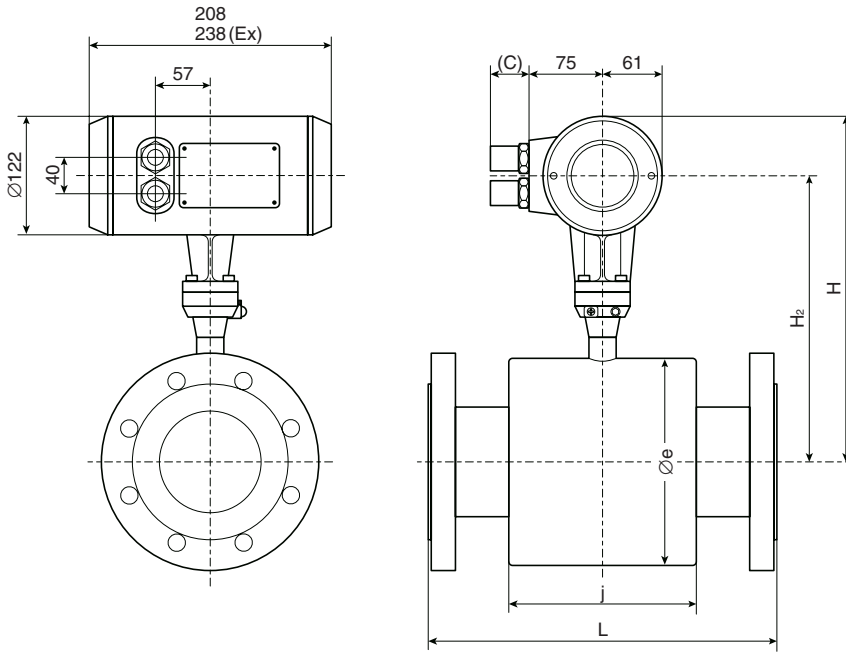
- Terminal type : Non Ex type; Plug-in type IEC terminals
Ex type; M4 screw terminal
- Connection capacity : Non Ex type; Power supply 0.5 to 2.5 mm²
Other terminals 0.5 to 1.5 mm²
Ex type; 0.5 to 2.5 mm²

DIMENSIONS

- Nominal size 25 to 65 mm



- Nominal size 80 to 300 mm



Nominal size	Dimension (mm)						Mass ^{*4} (kg)
	L ^{*2}		H ^{*3}	H ₂ ^{*3}	j	e	
	JIS10K	ANSI 150					
25	250	250	258	197	120	106	8.5
32	260	260	257	196	120	106	11
40	270	270	257	196	120	106	12
50	300	300	273	212	152	133	15
65	300	300	273	212	152	133	18
80	300	350	304	243	170	190	19
100	350	350	317	256	190	215	21
125	350	350	328	267	210	237	25
150	350	400	343	282	236	266	30
200	400	400	389	328	225	359	53
250	400	500	413	352	260	407	63
300	500	500	438	377	290	457	78

*1 (Ex) shows Explosion proof type

*2 Consult Tokyo Keiso face to face dimension (L) if flange rating is other than JIS10K or ANSI class 150

*3 H and H₂ length for Explosion proof type is 8 mm longer

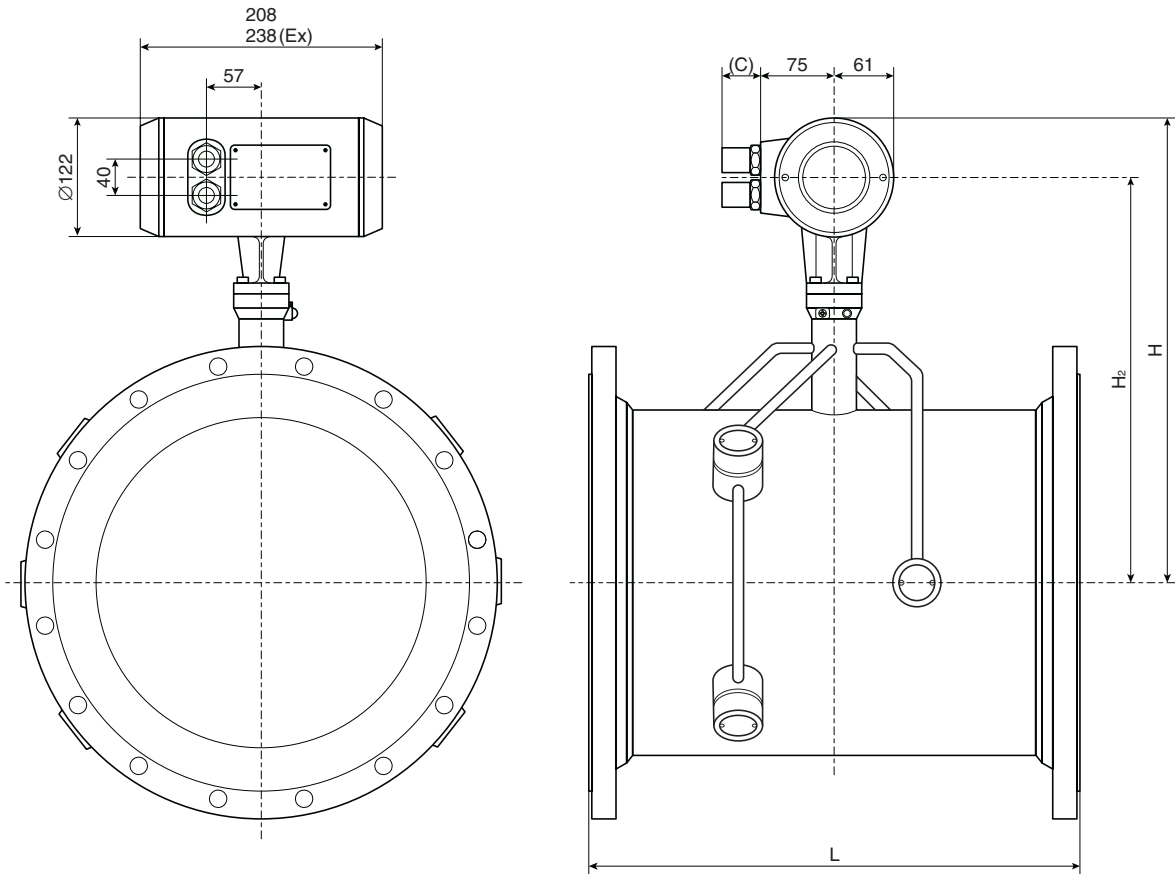
*4 Mass is for JIS 10 K flange

*5 Dimension C

26 mm with G1/2 or 1/2 NPT female adapter

74 mm with Ex d cable glands for TIIS Ex d type

- Nominal size 25 to 65 mm



Nominal size	Dimension (mm)				Mass *4 (kg)
	L *2		H *3	H ₂ *3	
	JIS10K	ANSI 150			
350	500	700	453	392	71
400	600	800	478	417	92
500	600	800	527	466	120

* Consult Tokyo Keiso for Nominal size over 500 mm

*1 (Ex) shows Explosion proof type

*2 Consult Tokyo Keiso face to face dimension (L) if flange rating is other than JIS10K or ANSI class 150

*3 H and H₂ length for Explosion proof type is 8 mm longer

*4 Mass is for JIS 10 K flange

*5 Dimension C

26 mm with G1/2 or 1/2 NPT female adapter

74 mm with Ex d cable glands for TIIS Ex d type

ORDERING INFORMATION

1. Model and Spec code

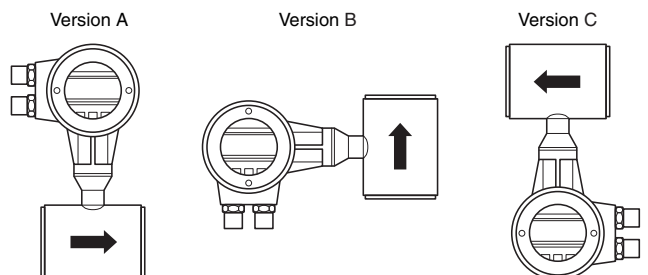
Ex) Model : UL3030K

Sensor spec code : VN5144M1012000010000

Converter spec code : VN5042D0023100000

2. Full scale flow rate (not required when option NS selected)
3. Mounting position of LCD display (Version A/B/C, Please refer "Mounting position")
4. Option code (if required)
Please refer optional item and add option code
5. Fluid name

Mounting position of LCD display



* The arrow indicates standard flow direction.
Flow direction can be changed by data setting.

MODEL CODE

- Nominal size 25 to 65 mm

Model: UL3030K (Non Ex type) / UL3030K-EEX (ATEX) / UL3030K-JEx (TIIS)

[Sensor spec code]

Sensor Spec code	VN51	4		1	1	2	0	0	0	2	1	0	0	0	0	Description	Std	
Sensor code	VN51															Type UFS3000 sensor (Nominal size 25 to 65 mm)	○	
(Fixed code)		4														Always 4	○	
Nominal size		4														25 mm / 1"	○	
		5														32 mm / 1 1/4"		
		6														40 mm / 1 1/2"	○	
		7														50 mm / 2"	○	
		8														65 mm / 2 1/2"		
Flange		3														Equivalent to DIN PN16 (only for 65 mm)		
		5														Equivalent to DIN PN40		
		6														Equivalent to DIN PN64		
		7														Equivalent to DIN PN100		
		A														Equivalent to ANSI class 150		
		B														Equivalent to ANSI class 300		
		D														Equivalent to ANSI class 600		
		E														Equivalent to ANSI class 900		
		M														Equivalent to JIS 20 K *1		
	N														Equivalent to JIS 10 K (only for size 50, 65 mm) *1	○		
Type /Protection class		1														Compact type/IP67	○	
Explosion proof		0														Without (Non Ex type)	○	
		1														ATEX EEx d [ib] II C T6-T3		
		A														TIIS Ex (pending)		
Cable entry		1														Without (Compact type with converter)	○	
Measuring tube/Flange material/Flange type		2														Stainless steel (equivalent to 316L SS)/Stainless steel (equivalent to 316L SS)	○	
Sensor cable		0														Without (Compact type with converter)	○	
Calibration		0														Standard calibration	○	
(Fixed code)										0	2	1	0	0	0	0	Always 0210000	○
Special feature																(Blank) None	○	
																/Z Involved		

[Converter Spec code]

Converter Spec code	VN50	4	2		0	2	1	2	0	0	0	0	Description	Std		
Converter code	VN50												Type UFC030 converter	○		
(Fixed code)		4											Always 4	○		
Type		2											Compact type	○		
Power supply		4											24 V DC			
		D											100 to 240 V AC	○		
Explosion proof		0											Non Ex	○		
		1											ATEX EEx d [ib] II C T6-T3			
		A											TIIS Ex (pending)			
Output		0											Standard	○		
(Fixed code)		2											Always 2	○		
Cable entries		2											1/2" NPT			
		3											G 1/2 female	○		
		4											M20 water proof gland			
		9											G1/2 Flame proof gland (for TIIS-Ex)	○		
Housing material		1											Aluminium casting	○		
(Fixed code)										2	0	0	0	0	Always 20000	○
Special feature													(Blank) None			
													/Z Involved			

*1 Select code M (JIS 20 K flange). JIS 20 K flange is used as standard for nominal size 25 to 65 mm (JIS 10 K and 20 K in these sizes are the same dimensions except thickness)

*2 Add [/Z] and describe special request. Consult availability of the special request to Tokyo Keiso prior to the order

- Nominal size 80 to 300 mm

Model: UL3030K (Non Ex type) / UL3030K-EEX (ATEX) / UL3030K-JEx (TIIS)

[Sensor spec code]

Sensor Spec code	VN52	4			1	1	0	0	0	2	1	0	0	0	Description	Std
Sensor code	VN52														Type UFS3000 sensor (Nominal size 80 to 300 mm)	○
(Fixed code)		4													Always 4	○
Nominal size			A												80 mm / 3"	○
			B												100 mm / 4"	○
			C												125 mm / 5"	○
			D												150 mm / 6"	○
			E												200 mm / 8"	○
			F												250 mm / 10"	○
			G												300 mm / 12"	○
Flange															Equivalent to DIN PN10 (only for size 200 to 300 mm)	
															Equivalent to DIN PN16 (only for size 100 to 150 mm)	
															Equivalent to DIN PN25 (only for size 100 to 300 mm)	
															Equivalent to DIN PN40 (only for size 80 mm)	
															Equivalent to DIN PN64	
															Equivalent to ANSI class 150	
															Equivalent to ANSI class 300	
															Equivalent to JIS 20 K	
Type/Protection class					1									Equivalent to JIS 10 K	○	
Explosion proof															Compact type/IP67	○
						0									Without (Non Ex type)	○
						1									ATEX EEx d [ib] II C T6-T3	
Cable entry															TIIS Ex (pending)	
						1									Without (Compact type with converter)	○
Measuring tube/Flange material/Flange type															Stainless steel (equivalent to 316L SS)/Carbon steel/Slip on *1	○
															Stainless steel (equivalent to 316L SS)/Stainless steel (equivalent to 316L SS)/Slip on	
															Stainless steel (equivalent to 316L SS)/Carbon steel/Butt weld *2	
															Stainless steel (equivalent to 316L SS)/Stainless steel (equivalent to 316L SS)/Butt weld	
Sensor cable														Without (Compact type with converter)	○	
Calibration														Standard calibration	○	
(Fixed code)														Always 0210000	○	
Special feature															(Blank) None	○
															/Z Involved	

[Converter Spec code]

Converter Spec code	VN50	4	2			0	2		1	2	0	0	0	0	Description	Std
Converter code	VN50														Type UFC030 converter	○
(Fixed code)		4													Always 4	○
Type			2												Compact type	○
Power supply															24 V DC	
															100 to 240 V AC	○
Explosion proof															Non Ex	○
															ATEX EEx d [ib] II C T6-T3	
															TIIS Ex (pending)	
Output														Standard	○	
(Fixed code)														Always 2	○	
Cable entries															1/2" NPT	
															G 1/2 female	○
															M20 water proof gland	
															G1/2 Flame proof gland (for TIIS-Ex)	○
Housing material														Aluminium casting	○	
(Fixed code)														Always 20000	○	
Special feature															(Blank) None	
															/Z Involved	

*1 Standard for JIS/DIN Flange

*2 Standard for ANSI Flange

*3 Add [/Z] and describe special request. Consult availability of the special request to Tokyo Keiso prior to the order

● Nominal size 350 to 2000 mm

Model: UL3030K (Non Ex type) / UL3030K-EEX (ATEX) / UL3030K-JEx (TIIS)

[Sensor spec code]

Sensor Spec code	VN53	4		1	1	0	0	0	2	0	0	0	0	0	Description	Std
Sensor code	VN53														Type UFS3000 sensor (Nominal size 350 to 2000 mm)	○
(Fixed code)		4													Always 4	○
Nominal size		H													350 mm / 14"	○
		K													400 mm / 16"	○
		L													450 mm / 18"	○
		M													500 mm / 20"	○
		N													600 mm / 24"	○
		P													700 mm / 28"	○
		R													800 mm / 32"	○
		S													900 mm / 36"	○
		T													1000 mm / 40"	○
		U													1200 mm / 48"	
		V													1400 mm / 56"	
	W													1600 mm / 64"		
	X													1800 mm / 72"		
	Y													2000 mm / 80"		
Flange		1													Equivalent to DIN PN6 (only for size 1200 to 2000 mm)	
		2													Equivalent to DIN PN10 (only for size 350 to 1000 mm)	
		3													Equivalent to DIN PN16	
		4													Equivalent to DIN PN25	
		5													Equivalent to DIN PN40	
		6													Equivalent to DIN PN64	
		A													Equivalent to ANSI class 150	
		B													Equivalent to ANSI class 300	
Type/Protection class		1													Compact type/IP67	○
		0													Without (Non Ex type)	○
		1													ATEX EEx d [ib] II C T6-T3	
		A													TIIS Ex (pending)	
Explosion proof																
Cable entry		1													Without (Compact type with converter)	○
		3													Carbon steel/Carbon steel/Slip on *1	○
		5													Stainless steel/Stainless steel/Slip on	
		C													Carbon steel/Carbon steel/Butt weld *2	
Measuring tube/Flange material/Flange type		E													Stainless steel/Stainless steel/Butt weld	
Sensor cable															Without (Compact type with converter)	○
Calibration															Standard calibration	○
(Fixed code)															Always 0210000	○
Special feature															(Blank) None	○
															/Z Involved	○

[Converter Spec code]

Converter Spec code	VN50	4	2		0	2	1	2	0	0	0	0	Description	Std		
Converter code	VN50												Type UFC030 converter	○		
(Fixed code)		4											Always 4	○		
Type		2											Compact type	○		
Power supply		4											24 V DC	○		
		D											100 to 240 V AC	○		
Explosion proof		0											Non Ex	○		
		1											ATEX EEx d [ib] II C T6-T3			
		A											TIIS Ex (pending)			
Output		0											Standard	○		
(Fixed code)													Always 2	○		
Cable entries															1/2" NPT	
															G 1/2 female	○
															M20 water proof gland	
															G1/2 Flame proof gland (for TIIS-Ex)	○
Housing material														Aluminium casting	○	
(Fixed code)														Always 20000	○	
Special feature															(Blank) None	○
															/Z Involved	○

*1 Standard for JIS/DIN Flange

*2 Standard for ANSI Flange

*3 Add [/Z] and describe special request. Consult availability of the special request to Tokyo Keiso prior to the order

* Specification subject to change without notice



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ISO 9001 Certified
JQA-2172