

## FLUORIDE / AMMONIUM / CYANIDE ION MONITOR

Models: FMS-3/NHMS-3/CNMS-3

This instrument, with auto-calibration and auto-cleaning function is, best suited for water quality monitoring of industrial water, effluent and river water. Stability under automatic operation and reliability are improved as DKK-TOA's experience in the field is reflected in the accurate sensor diagnostics using AI technology. Measurements of up to three items (optional) is possible, reducing the running costs.

### FEATURES

- Sensor diagnostics uses "fuzzy logic" theory. Sensor condition is automatically determined and suitable calibration cycle is set according to the sensitivity of the sensor.
- Displays internal status of instrument on LED display. Ease operation and maintenance are attained as next calibration time, sensitivity of sensor, calendar, error information and records are displayed on LED indicator.
- Simple key operation without any numeric keypad operation and operation mistakes are prevented with key lock function.
- Varieties of operation mode available. Operation modes such as external start-up, calibration, stop or auto calibrations are selectable.
- 4~20mA DC output and 0~1V DC for internal (option) recorder data outputs are available. Available contact point outputs include high, low, higher/high, lower/low limits, under calibration and alarm. For connection with PC, RS-232C is available as option. By connecting interface server TCS07152D, data management and control via LAN is available.



- Simultaneous measurements of up to 3 different sample types are available by adding additional measurement units. (Maximum 3 channels.)\*
- Highly accurate data available with adoption of thermostatic bath.

\*Rack construction differs with number of channels.

### STANDARD SPECIFICATIONS

Name	Fluoride ion monitor	Ammonium ion monitor	(Free) Cyanide ion monitor
Model	FMS-3	NHMS-3	CNMS-3
Method	ion electrode.		
Range	0.20~1000mg/L.	0.5~100mg/L.	0.2~5mg/L.
Repeatability	0.05pF ( 0.1mg/L at 1mg/L).	0.05pNH <sub>4</sub> ( 0.1mg/L at 1mg/L).	0.05pCN ( 0.1mg/L at 1mg/L).
Response	Within 5 min. at 90% response (by standard solution).		
Temp. compensation	Constant temperature measurement method.		
Meas. method	Continuous measurement.		
Auto calibration	Periodical calibration or auto setting cycle based on fuzzylogic theory.		
Auto cleaning	Auto acid cleaning for measuring cell, auto city water cleaning for pre-treatment tank.		
Display	4 digits LED display.		
Measuring point	Standard single ch (max. 3 ch).		
Status display	Dot matrix LCD (128 x 64 dots with auto power off back light) Display items: Time, electrode e.m.f. measuring cell temperature, next calibration time sensor diagnosis value, higher/high, high, low, lower/low limits, equipment abnormality, calibration & abnormality data (history).		
Operation	Measurement start, calibration start, cleaning start, stop, city water supply to thermostatic chamber, pre-treatment tank & measuring cell cleaning, sample injection, standard solution injection, reagent injection.		
Output signal	Linear or log output, 4-20m ADC (load: 650 Ω), 0-1VDC (for optional recorder).		
External contact outputs	Equipment abnormality, output during measurement, higher/high, high, low, lower/low limits, non-voltage a contact, contact capacity 100V, 0.1A, resistive load.		
External inputs	Measurement start, calibration start, cleaning start, stop, non-voltage a contact input.		
Reagent	Ion strength adjuster (F, CN) approx. 15-20L/month, bottle capacity: 10L. Sodium hydroxide (NH <sub>4</sub> ) approx. 6-7L/month, bottle capacity: 10L. Acid cleaning solution *1: approx. 10L/month bottle capacity: 10L (F, CN) approx. 3L/month (NH <sub>4</sub> ) bottle capacity 10L, CAL.L & H calibration solution *1: approx. 10L/month ea.		

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Name	Fluoride ion monitor	Ammonium ion monitor	(Free) Cyanide ion monitor
Sample water condition	Water temp: 5-40°C (no freezing) SS: 50mg/L or less (particle diameter: 100 μm or less) No interfering ions should exist. Pressure: 0.01-0.05MPa.		
	pH range: pH4-pH8 (< 200mg/L) pH5-pH9 (> 200mg/L)	pH range: pH6-pH8	pH range: pH7 or more
Influence of co-existing ion & interfering ions	Selectivity coefficient *2 at 10 <sup>-1</sup> mol/L F <sup>-</sup> : OH <sup>-</sup> =10 <sup>1</sup> , HPO <sub>4</sub> <sup>2-</sup> , HCO <sub>3</sub> <sup>-</sup> =10 <sup>3</sup> (pH7~8) Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> =10 <sup>5</sup>	Amine	Selectivity coefficient *2 at 10 <sup>-3</sup> mol/L CN <sup>-</sup> : Cl <sup>-</sup> , F <sup>-</sup> , CO <sub>3</sub> <sup>2-</sup> =10 <sup>5</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , PO <sub>4</sub> <sup>3-</sup> =10 <sup>4</sup> , Br <sup>-</sup> =10 <sup>3</sup> , S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> =10 <sup>1</sup> , I <sup>-</sup> =10 <sup>-1</sup> , S <sup>2-</sup> must be absent.
Sample volume	Approx. 5mL/min.	Approx. 30mL/min.	Approx. 5mL/min.
Pre-treatment Tank	Volume: 2~5 Litre/min. (capacity: 500ml).		
City water Condition	City water: Pressure: 0.05~0.5MPa, Consumption: approx. 50L/day. Application: cleaning of filter in pre-treatment tank, water supply to thermostat chamber.		
Waste water treatment	Treatment required such as pH neutralization by reagents or sample water.		
Piping connection	Sample port; 25VP (PVC pipe) socket, city water port; 13A socket for water supply plug, pre-treatment tank & meas. tank waste water; 40VP (PVC pipe) socket, Receiving plate waste water; 13VP (PVC pipe)		
Colour Finish	Munsell 5Y7/1.		
Dimensions	600(w) x 1600(h) x 550(d), anchor plan: 550x400, 4x13 dia holes, for standard single channel unit		
Weight	Approx. 130kg (except reagent) for standard single channel instrument		
Power source	AC line 10% 50/60Hz within 200VA *3.		
Ambient conditions	0~40°C, less than 90%RH Not to be installed where instrument is exposed to direct sunlight.		
Options	(1). 100mm wide recorder (built-in-type) (2). RS-232C interface.		

**Notes:**

- \*1 Changed depending on the cycle of cleaning & calibration.
- \*2 Selectivity coefficient of 10x means that the same indication is given when 10 times of each co-existing ion is contained in the sample.
- \*3 For standard single channel instrument. Contact us for information on 2ch or 3ch versions.

**STANDARD ACCESSORIES (Indicated quantity is for 1 channel use)**

**Fluoride**

Name	Standard	Quantity	Remarks
Uni tube	∅ 3×5 5m	1	
Silicon tube	∅ 6×8 1m	1	
Teflon tube	∅ 3×4 10m	1	
Sleeve	For ∅ 4 10 ea	1	
Ion strength adjustor	TISAB-11 10L	1	
Fluoride standard solution	F-1000 500ml	*	
Inner solution for reference electrode	KCl3.3N, RE-4C	1	500ml
Acid cleaning solution	Hydrochloric acid 10w/v% 10L	1	
Instruction manual		1	

**Ammonium**

Name	Standard	Quantity	Remarks
Uni tube	∅ 3×5 5m	1	
Silicon tube	∅ 6×8 1m	1	
Teflon tube	∅ 3×4 10m	1	
Sleeve	For ∅ 4 10 ea	1	
Alkali reagent	NaOH 20w/v% 10L	1	
Acid cleaning solution	Nitric acid 10w/v% 10L	1	
Ammonium standard solution	NH4-1000 500ml	*	
Instruction manual		1	

**Cyanide**

Name	Standard	Quantity	Remarks
Uni tube	∅ 3×5 5m	1	
Silicon tube	∅ 6×8 1m	1	
Teflon tube	∅ 3×4 10m	1	
Sleeve	For ∅ 4 10 ea	1	
Ion strength adjustor	ISA-CN 10L	1	
Cyanide standard solution	CN-100 500ml	*	Production by order
Inner solution for reference electrode	KCl3.3N, RE-4C	1	500ml
Acid cleaning solution	Hydrochloric acid 10w/v% 10L	1	
Instruction manual		1	

\*Differs depending on measurement range.

## SPARE PARTS (OPTIONAL) FOR 1-YEAR OPERATION (Indicated quantity is for 1 channel use)

### Fluoride

Name	Standard	Quantity	Remarks
Fluoride ion electrode	F-125	2	
Reference electrode	HS-510C	2	
Ion strength adjustor *1	TISAB-11 10L	22	
Fluoride standard solution *1	*2	*2	
Inner solution for reference electrode *1	KCl3.3N, RE-4C	2	500ml
Acid cleaning solution *1	Hydrochloric acid 10w/v% 10L	12	
Measurement cell stirrer motor	R4322-76881A	1	
Stirrer unit	5048	1	
Stirrer motor for thermostatic bath	OIK3GN-B	1	
Gear head	OGN7.5K	1	
Bearing	PB608S	1	
Uni tube	Ø3×5 5m	1	
Silicon tube	Ø6×8 1m	1	
Teflon tube	Ø3×4 10m	1	
Sleeve	For Ø4 10 ea	1	
Heater for thermostatic bath	100V, 50W, 50729T1	1	
Diaphragm for water measuring pump	For EH-B10VC	1	
Valve unit for water measuring pump	For EH-B10VC	2	
Diaphragm for reagent pump	For EH-B10VC	1	
Valve unit for reagent pump	For EH-B10VC	2	
Electrode packing for ion & reference electrode	For Ø11.5 rubber cap No. 4	4	For Ø11.5 electrode
Electrode packing for temperature electrode	For Ø6 rubber cap No. 1	2	For Ø6 electrode

### Ammonium

Name	Standard	Quantity	Remarks
Ammonium ion electrode	AE-235B	2	
Alkali reagent *1	NaOH 20w/v% 10L	8	
Acid cleaning solution *1	Nitric acid 10w/v% 10L	6	
Ammonium standard solution *1	NH4-1000 500ml	*2	
Measurement cell stirrer motor	R4322-76881A	1	
Stirrer unit	5048	1	
Stirrer motor for thermostatic bath	OIK3GN-B	1	
Gear head	OGN7.5K	1	
Bearing	PB608S	1	
Uni tube	Ø3×5 5m	1	
Silicon tube	Ø6×8 1m	1	
Teflon tube	Ø3×4 10m	1	
Sleeve	For Ø4 10 ea	1	
Heater for thermostatic bath	100V, 50W, 50729T1	1	
Diaphragm for water measuring pump	For EH-B30VC	1	
Valve unit for water measuring pump	For EH-B30VC	2	
Diaphragm for reagent pump	For EH-B10VH	1	
Valve unit for reagent pump	For EH-B10VH	2	
Electrode packing for ion electrode	51463-23	2	For ammonium electrode
Electrode packing for temperature electrode	For Ø6 rubber cap No. 1	2	For Ø6 electrode

## SPARE PARTS (OPTIONAL) FOR 1-YEAR OPERATION (Indicated quantity is for 1 channel use)

### Cyanide

Name	Standard	Quantity	Remarks
Cyanide ion electrode	CN-125B	2	
Reference electrode	HS-510C	2	
Ion strength adjustor *1	ISA-CN	22	
Cyanide standard solution *1, *3	CN-100 500ml	*2	Production by order
Inner solution for reference electrode *1	KCl3.3N, RE-4C	2	500ml
Acid cleaning solution *1	Hydrochloric acid 10w/v% 10L	12	
Measurement cell stirrer motor	R4322-76881A	1	
Stirrer unit	5048	1	
Stirrer motor for thermostatic bath	OIK3GN-B	1	
Gear head	OGN7.5K	1	
Bearing	PB608S	1	
Uni tube	Ø3×5 5m	1	
Silicon tube	Ø6×8 1m	1	
Teflon tube	Ø3×4 10m	1	
Sleeve	For Ø4 10 ea	1	
Heater for thermostatic bath	100V, 50W, 50729T1	1	
Diaphragm for water measuring pump	For EH-B10VC	1	
Valve unit for water measuring pump	For EH-B10VC	2	
Diaphragm for reagent pump	For EH-B10VH	1	
Valve unit for reagent pump	For EH-B10VH	2	
Electrode packing for ion & reference electrode	For Ø11.5 rubber cap No. 4	4	For Ø11.5 electrode
Electrode packing for temperature electrode	For Ø6 rubber cap No. 1	2	For Ø6 electrode
Sodium hydroxide *1	1 <sup>st</sup> grade 500g	1	For calibration solution adjustment

\*1. Not included when "except reagent" is specified.

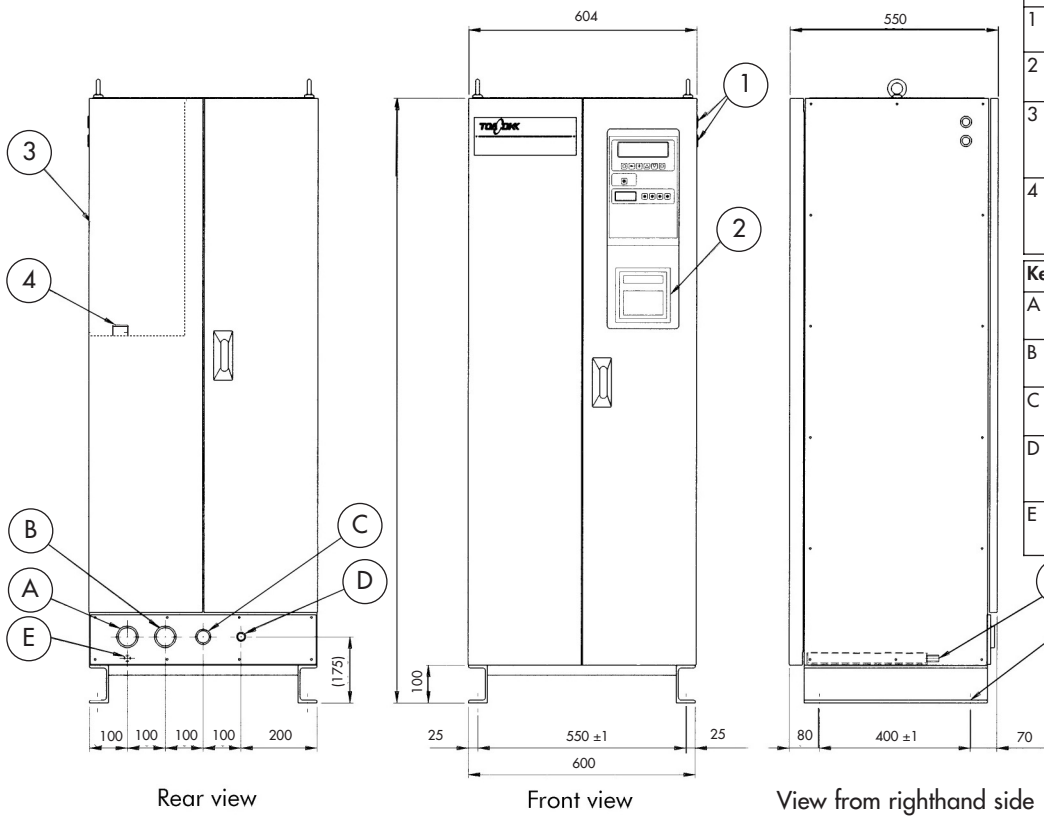
\*2. Differs depending on measurement range.

\*3. Approx. 1 month is required for delivery as the item is produced by order.

### YEARLY SUPPLY OF SPARE PARTS (OPTIONAL)

Recorder model no.	Type	Standard	Quantity	Remarks
SA-101P	Recording paper 2 ea	DX033-130 (divided into 50)	10	To be selected according to meas. range
	Recording paper 2 ea	DX033-230 (divided into 40)	10	To be selected according to meas. range
	Recording paper 2 ea	DX033-330 (divided into 60)	10	To be selected according to meas. range
PHC	Recording pen	T52985 (Red)	2	For 1 channel
	Recording paper 6 ea	PEX00DL1-5000B	2	
	Recording head	PHZH1002	2	

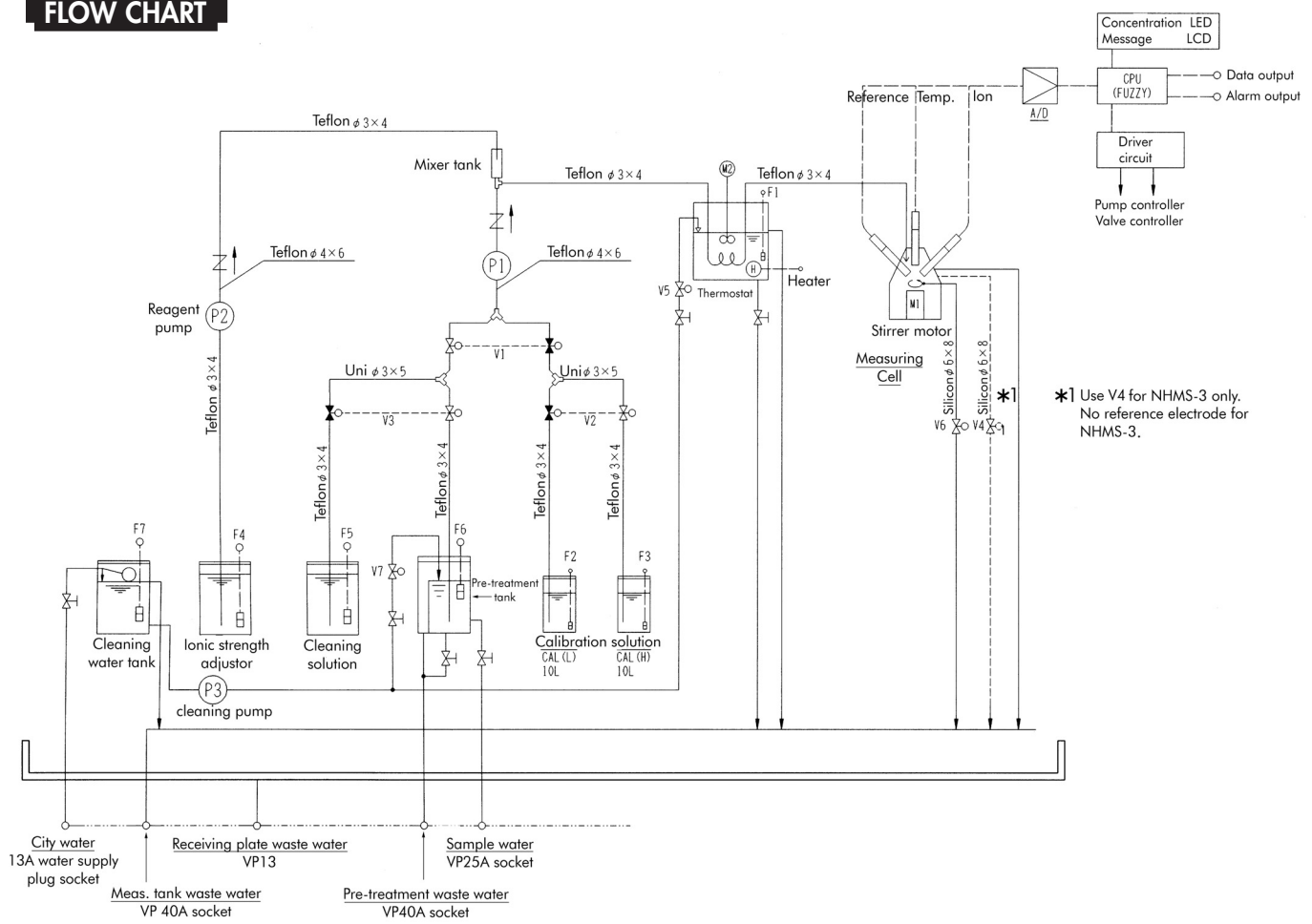
## DIMENSIONS Units: mm

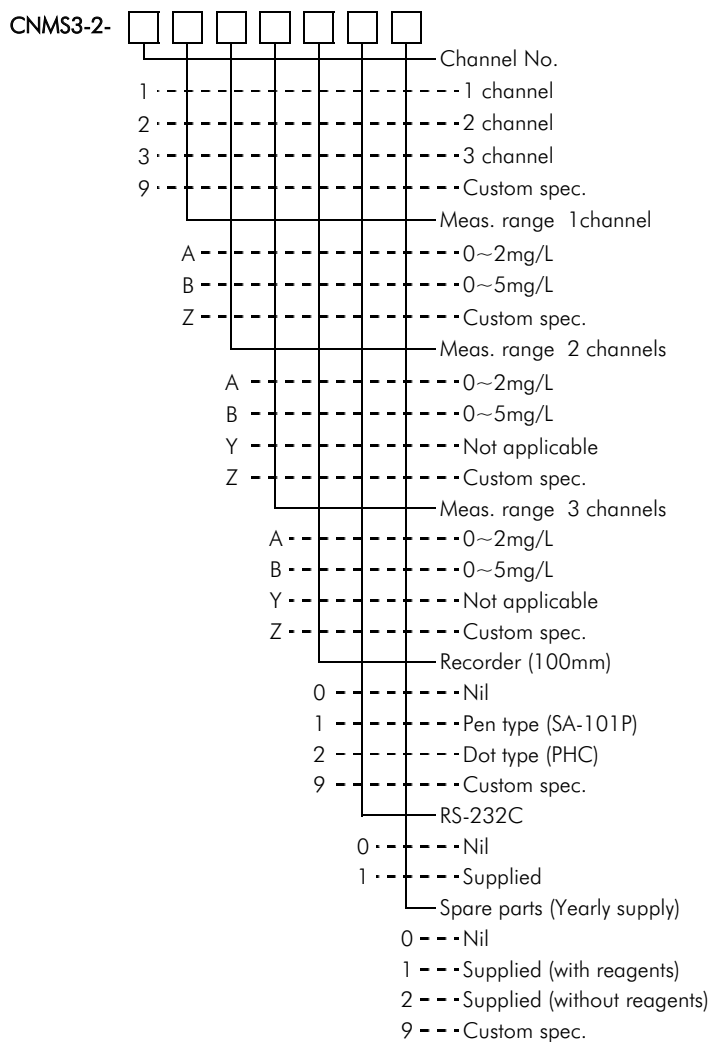
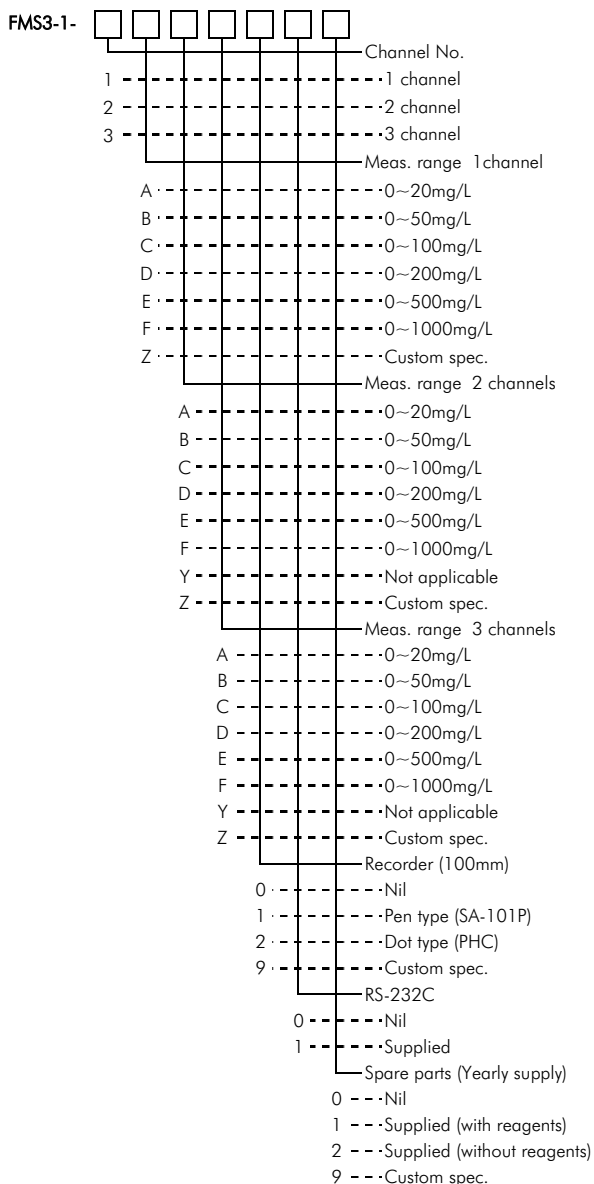


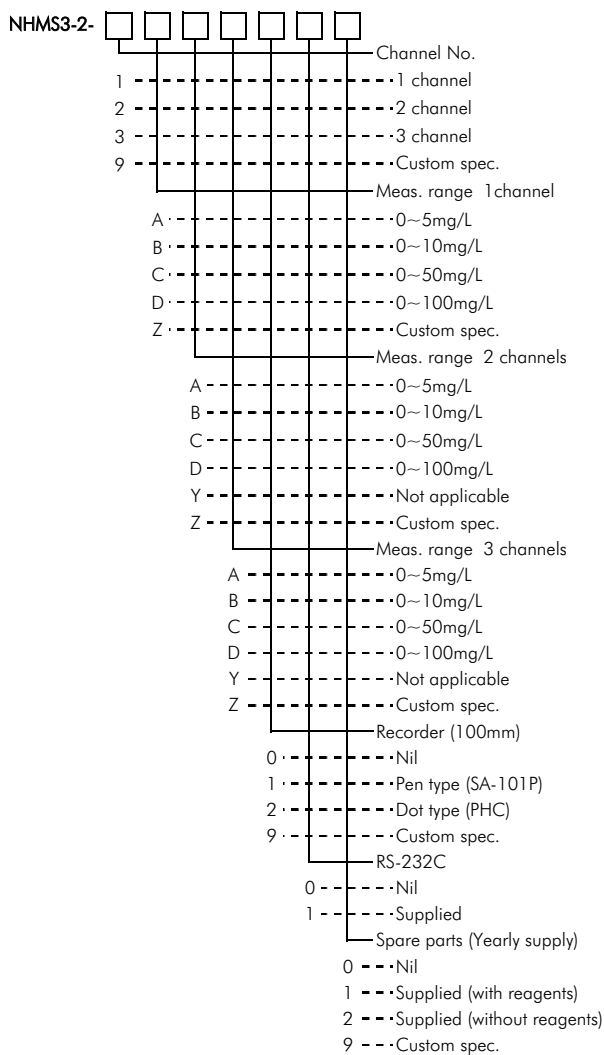
No.	Name	Remarks
1	Wiring port	Ø30 (2 sections)
2	Recorder	Option
3	External in/output terminal plate	TB1
4	External in/output terminal plate	TB2

Key	Name	Remarks
A	Pre-treatment tank waste water	VP40A Socket
B	Measuring tank waste water	VP40A Socket
C	Sample water	VP25A Socket
D	City water	13A water supply plug socket
E	Receiving plate waste water	VP13

## FLOW CHART







## DKK-TOA CORPORATION



## CAUTION

Do not operate products before consulting instruction manual.

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Information and specifications are for a typical system and are subject to change without notice.