

## DM4N Series

### Digital Tank Gauge Transmitter

#### OUTLINE

The DM4N series is a digital data transmitter with a built-in microprocessor. Installed at tank side, the DM4N series collects and transmits liquid level data in digital signals from tank gauges as well as liquid temperature from sensors inside tanks and status contact signals from valves or others used for loading and unloading operations.

Keeping the compatibility of signals and installation methods with the existing well-established DM4 series the DM4N has enhanced its reliability much more.

#### MODELS

- 2-way communication type: DM4N-2

Upgrading the existing DM4-2 type with 2-way bus communication, the DM4N-2 is capable of transmitting information additionally from the control room to the tank side. Thus, the DM4N-2 allows us to manipulate equipment remotely in addition to monitoring of liquid levels and status of tank operation. By sharing a common bus line on which multiple equipment can be connected in series, the wiring cost is reduced significantly. The same bus line is used for FW-9000N also as the bus is compatible with its standard output signal.

- 1-way communication type: DM4N-1 and DM4N-3

Both models are compatible with DM and DB-M type transmitters which transmit signals from the tank side to the control room in one direction. Two types are available; one is DM4N-1 which is the successor to DM4-1 with a 2-wire system, common to both power and signal; the other is DM4N-3 which is the successor to DM4-3 with an AC power supply system.

#### FEATURES

- No transmission error with resolution of 1 mm thanks to digital transmission
- High reliability and conversion accuracy with  $\pm 1$ mm
- Easy calibration by using an in-house counter for transmitter monitoring
- Easy expansion and replacement because of compatibility with the existing other TOKYO KEISO's level transmitters
- Connectable to the existing spot type and multipoint averaging temperature sensors
- Remote monitoring and control in combination with TOKYO KEISO's digital tank data receiving instruments.
- Continuous power supply 85 to 240 V AC 50/60 Hz for AC types
- Flameproof construction complying with TIIS d2G4 is standardized for all models
- Lightning protection circuit with much more increased safety than existing models is provided as standard

#### APPLICATIONS

Remote monitoring and control for tank operation for:  
Cone-roof tanks, Floating-roof tanks for crude oil, LPG tanks with pressure, Tanks for refinery and others

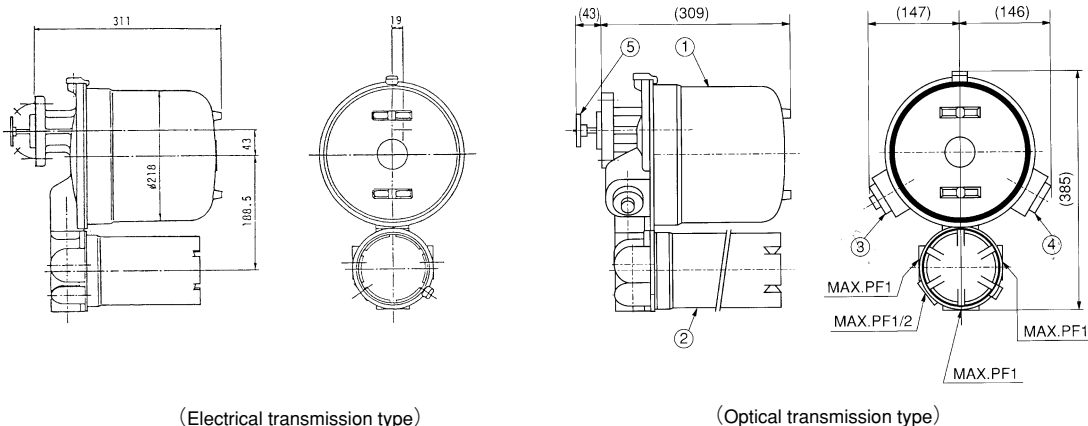


2-WAY COMMUNICATION TYPE : DM4N-2

SPECIFICATIONS DM4N-2

ITEMS		CONTENTS
Applicable level gauges		(1) FT-1000 series Spring balance type (2) FT-2000 series Servo balance type (3) FW-2200 series All wire servo balance type (4) FP-1000 series Magnet float type (5) Other manufacturers' tank side level gauges. Couplings are available.
Connectable receivers as examples		CATAMS Tank monitoring system, NMR-4000 series, DIR-530 series
Inputs	(1) Level	Level conversion range : 0 to 40 m, 0 to 60 m Resolution : 1 mm Conversion accuracy : ±1 mm
	(2) Temperature	Temperature elements : Pt, JPt, Cu Element configuration : Spot, Averaging temperature sensors ATM, Multi-points and averaging temperature sensors ATS, 3-wire independent spot Conversion range : -199 to 299°C compatible output with FW-9000, -199 to 199°C compatible output with DM-II Resolution : 0.1°C Conversion accuracy : ±0.6°C at 25°C Element intervals : 1 m, 2 m, 3 m, On request, Switching hysteresis : 100 mm Number of elements : 10 as standard, maximum 16 for ATM and ATS, 3 as standard, maximum 6 for 3-wire independent spot
	(3) External contact signals	: 4 or 10 in number, 12 VDC, 5 mA
Out-puts	(1) Alarm outputs	3 micro-switches with rating 250 VAC/3 A, 125 VDC/0.4 A (resistance load) 1 relay contact signal with rating 250 VAC/3 A, 30 VDC/3 A (resistance load)
	(2) Relay output for external control	Controlled by receiving instrument, Ordinary relays or Latching relays 4 to 10 in number. Contact rating : 250 VAC/3 A, 30 VDC/3 A (resistance load) Protection of contact : A varistor is standardized. When connecting induction load, connect a spark arrester on the load.
	(3) Output for DIR-110	Connectable with TOKYO KEISO's DIR-110 type tank side indicator
Com-muni-cation	(1) Compatible with FW-9000 type	Transmission method 2-way, 2-wire bus line system with maximum 16 transmitters/bus line Transmission signals Requesting : Voltage signal, Answering : Current modulation signal Transmission distance Wiring resistance of single line must be 170 Ω or less and capacitance between wires 0.4 μF or less
	(2) Compatible with DM-II type	Transmission method 2-way, 2-wire bus line system with maximum 16 transmitters/bus line Transmission signals Requesting : Voltage signal, Answering : Current modulation signal Transmission distance Wiring resistance of single line must be 170 Ω or less and capacitance between wires 0.8 μF or less
	(3) Compatible with FW-9000 optical communication type	Compatible with TOKYO KEISO's optical communication system
	(4) Compatible with V1 (under preparation)	Compatible with products of Endress + Hauser
Power supply		85 to 264 VAC 50/60 Hz
Power consumption		4.3 VA at steady state
Lightning protection		Lightning arrester is built-in in signal and power line
Ambient temperature		-10 to +60°C
Construction		Flameproof TIIIS d2G4, TIIIS d2G5 for optical communication type Protection class IP65
Number of cable entries		Maximum 4 (1" x 3 and 1/2" x 1)
Housing material		Aluminum alloy casting
Mass		Approximately 12 kg
Painting color		Silver

DIMENSIONS DM4N-2



■ MODEL CODE DM4N-2

DM4N-2-	1	-T							-D					-M	/	CONTENTS
Signal format *	1															Compatible with FW-9000 standard output type
	2															Compatible with DM-II transmitter type
	3															Compatible with FW-9000 optical output type
	4															Compatible with V1 (under preparation)
Power supply	1															85 to 264 V AC 50/60 Hz
Measuring range	1															40 m
	2															60 m (One microswitch is used.)
Temperature sensors	0															No element
	1															Spot
	2															Average-1 ATM
	3															Average-2 ATS
	4															Average-3 3-wire independent spot
Temperature elements	0															No element (No code required if elements not involved)
	1															Pt 100 Ω at 0°C
	2															JPt 100 Ω at 0°C
	3															Cu 100 Ω at 25°C
Temperature conversion range	0															No element (No code required if elements not involved)
	1															-199 to 299°C compatible output with FW-9000
	2															-199 to 199°C compatible output with DM-II
Average temperature element interval	0															No spot nor element (No code required if elements not involved)
	1															1 m interval
	2															2 m interval
	3															3 m interval
	* X															Other interval
Number of temperature elements *	0															No spot nor element (No code required if elements not involved)
	A															10 elements or less for ATM/ATS
	3															3 elements for 3-wire independent spot
	n															Number of elements When using ATM/ATS : n=B to G (11 to 16 elements) When using 3-wire independent spot : n=4 to 6
Number of contact inputs *	0															None
	4															4 or less
	n															5 or more When using compatible output with DM-II n=5 to A (A=10) When using other signal format n=5 to 8
Number and type of contact outputs *	0															None
	4															4 or less
	n															5 or more When using compatible output with DM-II n=5 to A (A=10) When using other signal format n=5 to 8
	1															Ordinary relay
	2															Latching relay
	1															NO contact
	2															NC contact
Level alarm outputs	0															None
	n															Designate a required number in "n". (n=1 to 3. However, one microswitch is used, when the measuring range is 60 m. Also, one microswitch is used to stop hoisting of the float when using hoisting function of the servo balance type tank gauges.)
Options	/E															An output to DIR-110
	/R															A relay output for alarm
	/S															A lightning arrester for the average temperature indication

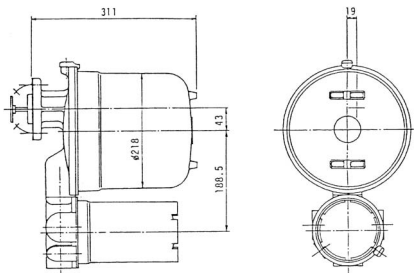
\*...Optional requirements

1-WAY COMMUNICATION TYPE : DM4N-1, DM4N-3

■ SPECIFICATIONS DM4N-1, DM4N-3

ITEMS	CONTENTS		
	DM4N-1	DM4N-3	
Applicable level gauges	(1) FT-1000 series Spring balance type (2) FT-2000 series Servo balance type (3) FW-2200 series All wire servo balance type (4) FP-1000 series Magnet float type (5) Other manufacturers' tank side level gauges. Couplings are available.		
Connectable receivers as examples	CATAMS Tank monitoring system, NMR-4000 series, DIR-530 series		
Inputs	(1) Level	Level conversion range : 0 to 40 m, 0 to 60 m Resolution : 1 mm Conversion accuracy : ±1 mm	
	(2) Temperature	Temperature elements : Pt, JPt, Cu Element configuration : Spot, Averaging temperature sensors ATM, Conversion range : -199 to 199°C Resolution : 0.1°C Conversion accuracy : ±0.6°C at 25°C Element intervals : 1 m, 2 m, 3 m, On request Switching hysteresis : 100 mm Number of elements : 10 as standard, maximum 16 for ATM	Temperature elements : Pt, JPt, Cu Element configuration : Spot, Averaging temperature sensors ATM, Multi-points and averaging temperature sensors ATS, 3-wire independent spot Conversion range : -199 to 199°C Resolution : 0.1°C Conversion accuracy : ±0.6°C at 25°C Element intervals : 1 m, 2 m, 3 m, On request Switching hysteresis : 100 mm Number of elements : 10 as standard, maximum 16 for ATM and ATS, 3 as standard, maximum 6 for 3-wire independent spot
	(3) External contact signals	8 in number, 5 VDC, 0.5 mA	4 or 8 in number, 12 VDC, 5 mA
	(4) Tank number transmission	The number is set by a rotary switch in 4 digits hexadecimal notation	
Outputs	(1) Alarm outputs	3 micro-switches with rating 250 VAC/3 A, 125 VDC/0.4 A (resistance load)	1 relay contact signal with rating 250 VAC/3 A, 30 VDC/3 A (resistance load)
	(2) Output for DIR-110	—	Connectable with TOKYO KEISO's DIR-110 type tank side indicator
Communication	Transmission method	Signal line 1:1 (2 lines/transmitter) Signal line matrix (2 lines/transmitter) Select line matrix (4 lines/transmitter)	
	Transmission signal	Answering : Current modulation signal	
	Signal format/ Transmission distance	(1) Compatible with DM type (100/150 mA) Wiring resistance of single line is 44 Ω or less and capacitance between wires 0.8 μF or less	
		(2) Compatible with DB-M type (70/110 mA) Wiring resistance of single line is 60 Ω or less and capacitance between wires 0.4 μF or less	
(3) Compatible with DM type (10/20 mA) Wiring resistance of single line is 170 Ω or less and capacitance between wires 0.8 μF or less			
(4) Compatible with DB-M type (10/20 mA) Wiring resistance of single line is 170 Ω or less and capacitance between wires 0.4 μF or less			
Calibration	With an indication counter for calibration of transmitter's output value		
Power supply	20 to 35 VDC supplied via signal line to receiver	85 to 264 VAC 50/60 Hz	
Power consumption	Maximum 150 mA	4.3 VA at steady state	
Lightning protection	Lightning arrester is built-in in signal and power line		
Ambient temperature	-10 to +60°C		
Construction	Flameproof TIIIS d2G4 Protection class IP65		
Number of cable entries	Maximum 4 (1" x 3 and 1/2" x 1)		
Housing material	Aluminum alloy casting		
Mass	Approximately 12 kg		
Painting color	Silver		

■ DIMENSIONS DM4N-1, DM4N-3



■ MODEL CODE DM4N-1, DM4N-3

DM4N-	-	-T	-D	-M	/	CONTENTS
Power supply	1					20 to 35 VDC supplied via signal line to receiver
	3					85 to 264 VAC 50/60 Hz
Signal format	1					Compatible with DM type (100/150 mA)
	2					Compatible with DB-M type (70/110 mA)
	3					Compatible with DM type (10/20 mA)
	4					Compatible with DB-M type (10/20 mA)
Wiring method	1					Signal line 1 : 1, Signal line matrix
	2					Select line matrix
Measuring range	1					40 m
	2					60 m (One microswitch is used.)
Temperature sensors ※1	0					No element
	1					Spot
	2					Average-1 ATM
	3					Average-2 ATS applied only for DM4N-3
	4					Average-3 3-wire independent spot applied only for DM4N-3
Temperature elements	0					No element (No code required if elements not involved)
	1					Pt 100 Ω at 0°C
	2					JPt 100 Ω at 0°C
	3					Cu 100 Ω at 25°C
Temperature conversion range	0					No element (No code required if elements not involved)
	1					-199 to 199°C
Average temperature element interval	0					No spot nor element (No code required if elements not involved)
	1					1 m interval
	2					2 m interval
	3					3 m interval
	* X					Other interval
Number of temperature elements	0					No spot nor element (No code required if elements not involved)
	A					10 elements or less for ATM/ATS
	3					3 elements for 3-wire independent spot applied only for DM4N-3
	* n					Number of elements When using ATM/ATS : n=B to G (11 to 16 elements) When using 3-wire independent spot : n=4 to 6
Tank number transmission	0					None
	1					Yes in 4 digits hexadecimal notation
Number of contact inputs	0					None
	4					4
	* n					Designate a number in "n" out of 5 to 8
Level alarm outputs	0					None
	n					Designate a required number in "n" . (n=1 to 3. However, one microswitch is used, when the measuring range is 60 m. Also, one microswitch is used to stop hoisting of the float when using hoisting function of the servo balance type tank gauges.)
Options	/E					An output to DIR-110 applied only for DM4N-3
	/R					A relay output for alarm applied only for DM4N-3
	/S					A lightning arrester for the average temperature indication

\* …Optional requirements

※1…When using DM4N-1 type whose current of signal format is 10/20 mA, you can not select other than "No element".

**ORDERING INFORMATION**

◎ Model code

· 2-WAY COMMUNICATION TYPE

DM4N-2-□□□-T□□□□□□-D□□□□□-M□/□□□□

· 1-WAY COMMUNICATION TYPE

DM4N-1-□□□-T□□□□□□-D□□□-M□/□□□□

DM4N-3-□□□-T□□□□□□-D□□□-M□/□□□□

Please enter the applicable code numbers when ordering.

◎ Type and specifications of level gauges to which this transmitter is to be connected

When installing the transmitter and level gauge simultaneously

When installing the transmitter connecting to existing TOKYO KEISO's level gauges

If so, enter our manufacturing No. of existing level gauges : \_\_\_\_\_

(Note: Manufacturing number is on name plates and PRODUCT SPECIFICATION in the form of L12-90027 for example)

Tag No. or Tank No. : \_\_\_\_\_

When installing the transmitter connecting the existing other manufacturer's level gauges

Name of manufacturer : \_\_\_\_\_

□□□□

Model No. : \_\_\_\_\_

Year of delivery : \_\_\_\_\_

When placing an order, state the dimension and connection size of coupling for installation. Consult TOKYO KEISO for details.

◎ Up to 3 contact signals by the in-house microswitches are available

Not required

Measuring range is 40 m or over     For hoist-up stop     HH alarm     H alarm     L alarm     LL alarm

◎ An Additional contact signal by a relay. This requirement is not available for DM4N-1

Not required

HH alarm     H alarm     L alarm     LL alarm

◎ Flameproof cable glands for terminal box cable entry

Not required     Required

◎ Specifications of cable entry. Refer to the drawing.

Bushing for cable entry location..."A"     not required     G1/2     G3/4     G1

If a cable gland required state cable diameter:  $\phi$     mm

Bushing for cable entry location..."B"     not required     G1/2     G3/4     G1

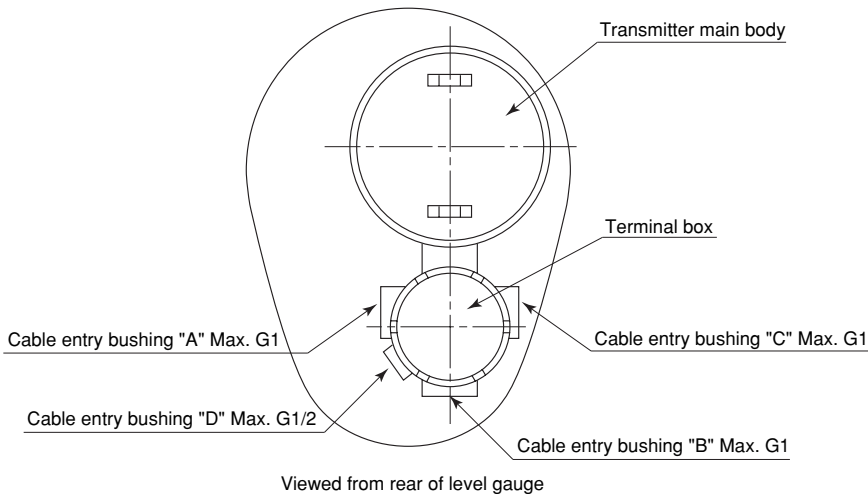
If a cable gland required state cable diameter:  $\phi$     mm

Bushing for cable entry location..."C"     not required     G1/2     G3/4     G1

If a cable gland required state cable diameter:  $\phi$     mm

Bushing for cable entry location..."D"     not required     G1/2

If a cable gland required state cable diameter:  $\phi$     mm



\* Specification is subject to change without notice.

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