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K3GN

1/32 DIN Digital Panel Meter

Optimal Panel Meter for Downsizing Equipment and Control Panels.
Models with Linear Current and Voltage Output Added to the Series.

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Additional Models

K3GN

1/32 DIN Digital Panel Meter

- Addition of models with linear current and voltage output
- CE marking and UL/CSA approval (scheduled to be free of hazardous substances by March 2006)
- Two-color display: green/red
- Multi-range input

48mm

24mm

83mm

- ● Accepts process voltage/current and pulse input, and displays digital data, all in one Unit.

- ● High visibility: 7-mm-high, 5-digit display with programmable display color.

- ● Selectable output: 2 relay outputs, 3 transistor outputs, and RS-485.

- ● Linear output: 0 to 20 mA DC, 4 to 20 mA DC; 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC

- ● Scaling, HOLD, and forced-zero functions.

- ● NEMA4X/IP66 front panel.

- ● EN/IEC conformity with CE marking and UL/CSA approval.

real*i*zing

Features

Lineup of Models with Linear Current and Voltage Output

Equipped with Data Transfer Output

New models with linear current/voltage output have been added to the series for convenience when handling logging of measurement signals and signal insulation.

DC current/current signal (pressure, distance, flowrate, etc.)

Outputs 1 and 2

Board-type computers and PLCs

4 to 20 mA DC

Rotary pulse signal (ON/OFF pulse, processor, etc.)
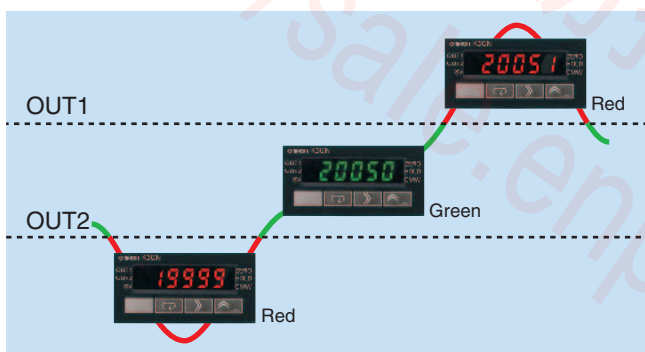
Outputs 1 and 2

1 to 5 VDC

Display Colors Change According to Judgment Outputs.
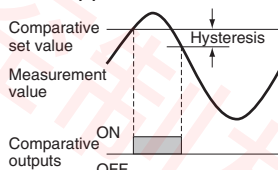
Two-color Display: Green/Red

Two-color Display: Green/Red

The measurement display section changes according to the comparative outputs. The status can be easily ascertained from a distance.

OUT1 — 20051 — Red

20050 — Green

OUT2 — 19999 — Red

Models Can Be Produced with Normally Energized Relays.

K3GN - ☐ - ☐ - 400 24 VDC

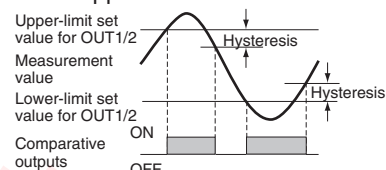**Note:** Refer to page 8 for information on models with normally energized relays.

Selectable Output Type.

There are two comparative outputs: OUT1 and OUT2. The OUT type for each can be selected from the following three types.
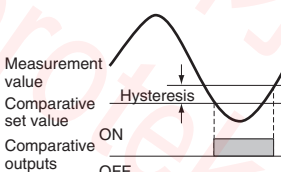
● Upper Limit

Comparative set value
Measurement value
Hysteresis
Comparative outputs ON OFF

● Upper/Lower Limit

Upper-limit set value for OUT1/2
Measurement value
Lower-limit set value for OUT1/2
Hysteresis
Hysteresis
Comparative outputs ON OFF

● Lower Limit

Measurement value
Comparative set value
Hysteresis
Comparative outputs ON OFF

Note: If Upper/Lower Limit is selected, the upper limit and lower limit for the comparative set value can be set individually and will be displayed for OUT1 and OUT2.

Expanded Range of Applications

Multi-range Input

● The input type can be selected from among DC voltage, DC current, and rotary pulse signals.

● By using communications, the panel meter can be used as a serial communications indicator that receives commands from a PLC or other external device.

- Process meter
- Rotary pulse meter
- Indicator for a PLC or computer using RS485 communications

V — DC voltage input
mA — DC current input
Ⅲ — Pulse signal input
Digital data

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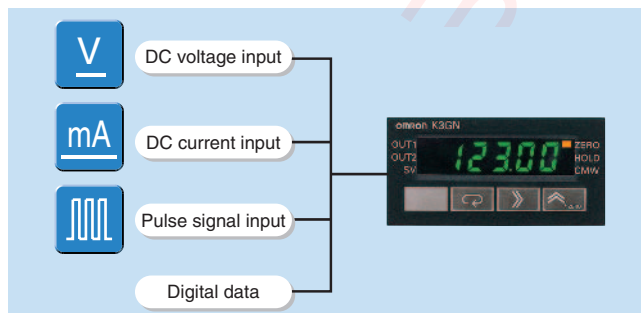
1/32 DIN Digital Panel Meter
K3GN

1/32 DIN Digital Panel Meter for Downsizing Equipment and Control Panels

- Compact size: 48 x 24 x 83 (W x H x D).
- Multi-input compatible: DC voltage/current, rotary pulse.
- Two display colors (switchable): green/red.
- Selectable outputs.
- CE marking and UL/CSA approval.
- Splash-proof construction (NEMA4X: equivalent to IP66).

⚠ Refer to *Safety Precautions* on page 14.

NEW

Model Number Structure

■ Model Number Legend

K3GN-☐☐**-**☐**-**☐ **24 VDC**
      1 **2** **3** **4**

1. Input Type
ND:	DC voltage/current, NPN
PD:	DC voltage/current, PNP

2. Output Type
C:	2 relay contact outputs (SPST-NO)
C-FLK:	2 relay contact outputs (SPST-NO) and RS-485
C-L1:	2 relay contact outputs (SPST-NO) and DC current (0 to 20 mA, 4 to 20 mA)
C-L2:	2 relay contact outputs (SPST-NO) and DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)
T1:	3 transistor outputs (NPN open collector)
T1-FLK:	3 transistor outputs (NPN open collector) and RS-485
T1-L1:	3 transistor outputs (NPN open collector) and DC current (0 to 20 mA, 4 to 20 mA)
T1-L2:	3 transistor outputs (NPN open collector) and DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)
T2:	3 transistor outputs (PNP open collector)
T2-FLK:	3 transistor outputs (PNP open collector) and RS-485

3. Option
None:	None
-400:	Normally energized relays

4. Supply Voltage
24 VDC:	24 VDC

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Ordering Information

■ List of Models

Supply voltage	Input type	Output type		Model
		Judgement output	Data transmission output	
24 VDC	DC voltage, DC current, or NPN input	2 relay contact outputs (SPST-NO)	None	K3GN-NDC 24 VDC
			RS-485	K3GN-NDC-FLK 24 VDC
			DC current (0 to 20 mA, 4 to 20 mA)	K3GN-NDC-L1 24 VDC
			DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)	K3GN-NDC-L2 24 VDC
		2 relay contact outputs (SPST-NO) Normally energized relays (See note.)	None	K3GN-NDC-400 24 VDC
			RS-485	K3GN-NDC-FLK-400 24 VDC
			DC current (0 to 20 mA, 4 to 20 mA)	K3GN-NDC-L1-400 24 VDC
			DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)	K3GN-NDC-L2-400 24 VDC
		3 transistor outputs (NPN open collector)	None	K3GN-NDT1 24 VDC
			RS-485	K3GN-NDT1-FLK 24 VDC
			DC current (0 to 20 mA, 4 to 20 mA)	K3GN-NDT1-L1 24 VDC
			DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)	K3GN-NDT1-L2 24 VDC
	DC voltage, DC current, or PNP input	2 relay contact outputs (SPST-NO)	None	K3GN-PDC 24 VDC
			RS-485	K3GN-PDC-FLK 24 VDC
		3 transistor outputs (PNP open collector)	None	K3GN-PDT2 24 VDC
			RS-485	K3GN-PDT2-FLK 24 VDC

Note: Refer to page 8 for information on models with normally energized relays.

Specifications

■ Ratings

Item		K3GN-ND With DC voltage, DC current, and NPN input	K3GN-PD With DC voltage, DC current, and PNP input
Supply voltage		24 VDC	
Operating voltage range		85% to 110% of the rated supply voltage	
Power consumption (at max. load) (See note 1.)		2.5 W max. (at max. DC load with all indicators lit)	
Input signal		DC voltage, DC current, no-voltage contact, open collector	
DC voltage/current input	A/D conversion	Double integral method	
Pulse signal input	Pulse measurement method	Periodic measurement method	
External power supply		None	
Control input		Present value hold or forced zero (selectable) (See note 2.)	
Outputs (Outputs depend on the model.)	Relay contact output	1 A, 30 VDC (resistive load), mechanical life: 50,000,000 operations min., electrical life: 100,000 operations min.	
	Transistor output	Max. load voltage: 24 VDC, Max. load current: 50 mA, Leakage current: 100 μ A max.	
	Communications output	RS-485 (2-wire, half-duplex)	
	Linear output	DC current (0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max., Resolution: Approx. 10,000) DC voltage (0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5k Ω min., Resolution: Approx. 10,000)	---
Display		Negative LCD (backlit LCD) display 7-segment digital display, character height: 7.0 mm, and single illuminated display	
Main functions		Scaling, prescaling, teaching, average processing, forced zero, display color selection, output type selection, key protection, startup compensation timer, hysteresis	
Ambient temperature		Operating: −10°C to 55°C (with no condensation or icing) Storage: −25°C to 65°C (with no condensation or icing)	
Ambient humidity		Operating: 25% to 85%	
Altitude		2,000 m max.	
Accessories		Rubber packing, fixture, operation manual	

Note: 1. A control power supply capacity greater than the rated capacity is required when the Digital Panel Meter is turned ON. Do not forget to take this into consideration when using several Digital Panel Meters. When power is supplied, all indicators will light and outputs will be OFF. When using startup compensation time operation, the display will read "00000" and all outputs will be OFF.

2. Enabled only when using DC voltage/current input. (Min.time for control signal input: 80 ms)

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■ Characteristics

Item		K3GN-ND With DC voltage, DC current, and NPN input	K3GN-PD With DC voltage, DC current, and PNP input
Input signal		DC voltage/current (4 to 20 mA, 1 to 5 V, ±5 V, ±10 V) No-voltage contact (30 Hz max. with ON/OFF pulse width of 16 ms min.) Open collector (5 kHz max. with ON/OFF pulse width of 90 μs min.)	
Displayable range		5 digits (-19999 to 99999)	
Sampling period		250 ms	
Display refresh period		Sampling period (sampling times multiplied by number of averaging times if average processing is selected.)	
Comparative output response time (transistor outputs)		750 ms max. (transistor output) (The time required for the judgment output to be output if the input signal rapidly changes from 15% to 95% or from 95% to 15%.)	
Linear output response time		750 ms max. (The time required for the analog output to be output if the output signal rapidly changes from 15% to 95% or from 95% to 15%.)	---
Insulation resistance		20 MΩ min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Dielectric strength		1,000 VAC for 1 min between external terminal and case.	
Noise immunity		±480 V on power supply terminals in normal mode, ±1,500 V in common mode, ±1 μs, or 100 ns for square-wave noise with 1 ns	
Vibration resistance		Vibration frequency: 10 to 55 Hz, Acceleration: 50 m/s^2 for 10 min each in X, Y, and Z directions	
Shock resistance		Models with transistor outputs: 150 m/s^2 three times each in 3 axes, 6 directions Models with contact outputs: 100 m/s^2 three times each in 3 axes, 6 directions	
Weight		Approx. 100 g (Main Unit only)	
Degree of protection	Front panel	NEMA4X for indoor use (equivalent to IP66),	
	Rear case	IP20	
	Terminals	IP00 and finger protection (VDE0106/100)	
Memory protection		Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)	
Approved standards		UL508, CSA C22.2 No. 142	

EMC		(EMI) EN 61326 Industry
		Emission Enclosure: EN55011 Group 1 class A
		(EMS) EN 61326 Industry
		Immunity ESD: EN 61000-4-2: 4 kV (contact discharge)
		                  8 kV (air discharge)
		Immunity RF-interference: EN 61000-4-3: 10 V/m (amplitude-modulated,
		                  80 MHz to 1 GHz)
		Immunity Fast Transient Noise: EN 61000-4-4: 2 kV (power line)
		Immunity Burst Noise: 1 kV line to line (I/O signal line)
		Immunity Surge: EN 61000-4-5: 2 kV line to ground (power line)
		Immunity Conducted Disturbance EN 61000-4-6: 3 V (0.15 to 80 MHz)
		Immunity Power Frequency Magnetic EN 61000-4-8: 30 A/m (50 Hz) continuous time	

■ Input Ranges: Measurement Range and Accuracy

Input type in-t	Analog AnALG					Pulse PULSE			Remote rmt
	DC current input	DC voltage input				Rotary pulse			
Analog range rAnGE	4 to 20 mA 4-20	Analog range rAnGE	1 to 5 V 1-5	±5 V 5	±10 V 10	Pulse frequency P-FrE	30 Hz 30	5 kHz 5μ	
Connection terminal	⑤-⑥	Connection terminal		④-⑤		Connection terminal		②-③	Range of display from 19999 to 99999 using communications.
Current range (mA) 20.00	22.00 [graph] 0.00	Voltage range (V) 10.00 5.000 0.000 −5.000 −10.00	5.500 [graph] 0.000	5.500 [graph] −5.500	11.00 [graph] −11.00	Frequency range (Hz) 5000 4000 3000 2000 1000 0.0	30.00 [graph] 0.05	5000 [graph] 0	
Input impedance	60 Ω	Input impedance	1 MΩ min.			---			---
Measurement accuracy	±0.1% full scale ± one digit max. (at 23±3°C)		±0.1% full scale ± one digit max. (at 23±5°C)		±0.1% full scale ± one digit max. (at 23±5°C)				---

Note: The shaded ranges indicate default settings.

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■ Input/Output Ratings

Relay Contact Output

(Incorporating G6K Relays)

Item	Resistive load (cosφ = 1)
Rated load	1 A at 30 VDC
Rated through current	1 A max. (at COM terminal)
Max. contact voltage	60 VDC
Max. contact current	1 A (at COM terminal)
Max. switching capacity	30 VA
Min. permissible load (P level, reference value)	10 mV, 10 µA
Mechanical life	50,000,000 operations min. (at a switching frequency of 36,000 operations/hr)
Electrical life (at an ambient temperature of 23°C)	100,000 operations min. (at the rated load with a switching frequency of 1,800 operations/hr)

Transistor Output

Rated load voltage	24 VDC
Max. load current	50 mA
Leakage current	100 µA max.

Communications Specifications

Item		RS-485
Communications method		2-wire, half-duplex
Synchronization method		Start-stop synchronization
Baud rate		1,200/2,400/4,800/9,600/19,200 bps
Transmission code		ASCII
Communications	Reading/Writing to the K3GN	Read/write comparative set values, read/write scaling values, enable/disable the writing of data through communications, forced-zero control, and other data.

Linear Output

Item	0 to 20 mA	4 to 20 mA	0 to 5 V	1 to 5 V	0 to 10 V
Permissible load impedance	500 Ω max.		5 kΩ min.		
Resolution	Approx. 10,000				
Output error	±0.5% full scale		±0.5 full scale. ±0.15 V at 1 V or less (no output for 0 or less)		

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Nomenclature

1. Main display
2. Status indicators
2. Status indicators
3. Level indicator
4. Level key
5. Mode key
6. Shift key
7. Up/Zero key

Name		Functions
1. Main display		Displays process values, parameters, and set values.
2. Status indicators	**OUT1**	Lit when output 1 is ON.
	OUT2	Lit when output 2 is ON.
	SV	Lit when a set value is being displayed or changed.
	T	Lit when the teaching function is enabled. Flashes when the K3GN is in teaching operation. Lit when a calibration value is being displayed during user calibration. Flashes while reading a calibration value.
	ZERO	Lit while the forced-zero function is activated.
	HOLD	Lit when HOLD input is ON.
	CMW	Lit when communications writing is "enabled" and is out when it is "disabled."
3. Level indicator		Displays the current level that the K3GN is in. (See below for details.)
4. Level Key		Used to change the level.
5. Mode Key		Used to allow the Main display to indicate parameters sequentially.
6. Shift Key		Used to enable that set value to be changed. When changing a set value, this key is used to move along the digits.
7. Up/Zero Key		Used to change a set value. Used to set or clear a forced-zero function when a measurement value is being displayed.

Level indicator	Level
P	Protect
Not lit	Operation
A	Adjustment
S	Initial setting
C	Communications setting
F	Advanced function setting
U	User calibration

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Models with Normally Energized Relays
K3GN-NDC-□-400 24 VDC

• The drive operation for the output relay is reversed in these models.
• Relay contacts can be made open (i.e., OFF) when comparative set values are being judged. This is effective when constructing systems that take failsafe measures into consideration.

List of Models

Models with Normally Energized Relays
K3GN-NDC-400 24 VDC
K3GN-NDC-FLK-400 24 VDC
K3GN-NDC-L1-400 24 VDC
K3GN-NDC-L2-400 24 VDC

Relation between Output Type and Relay Output Operation

Note: If Upper/Lower Limit is selected, the upper limit and lower limit for the comparative set value can be set individually and will be displayed for OUT1 and OUT2.

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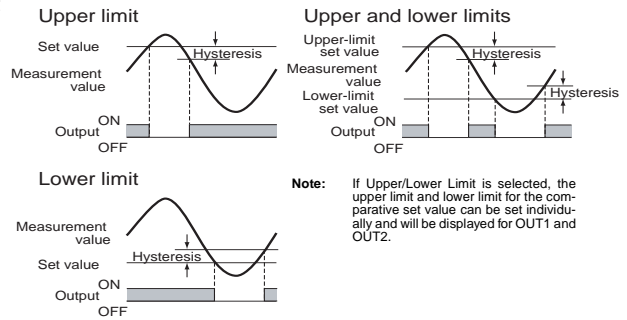
Connections

■ Terminal Arrangement

Output terminals

Input terminals
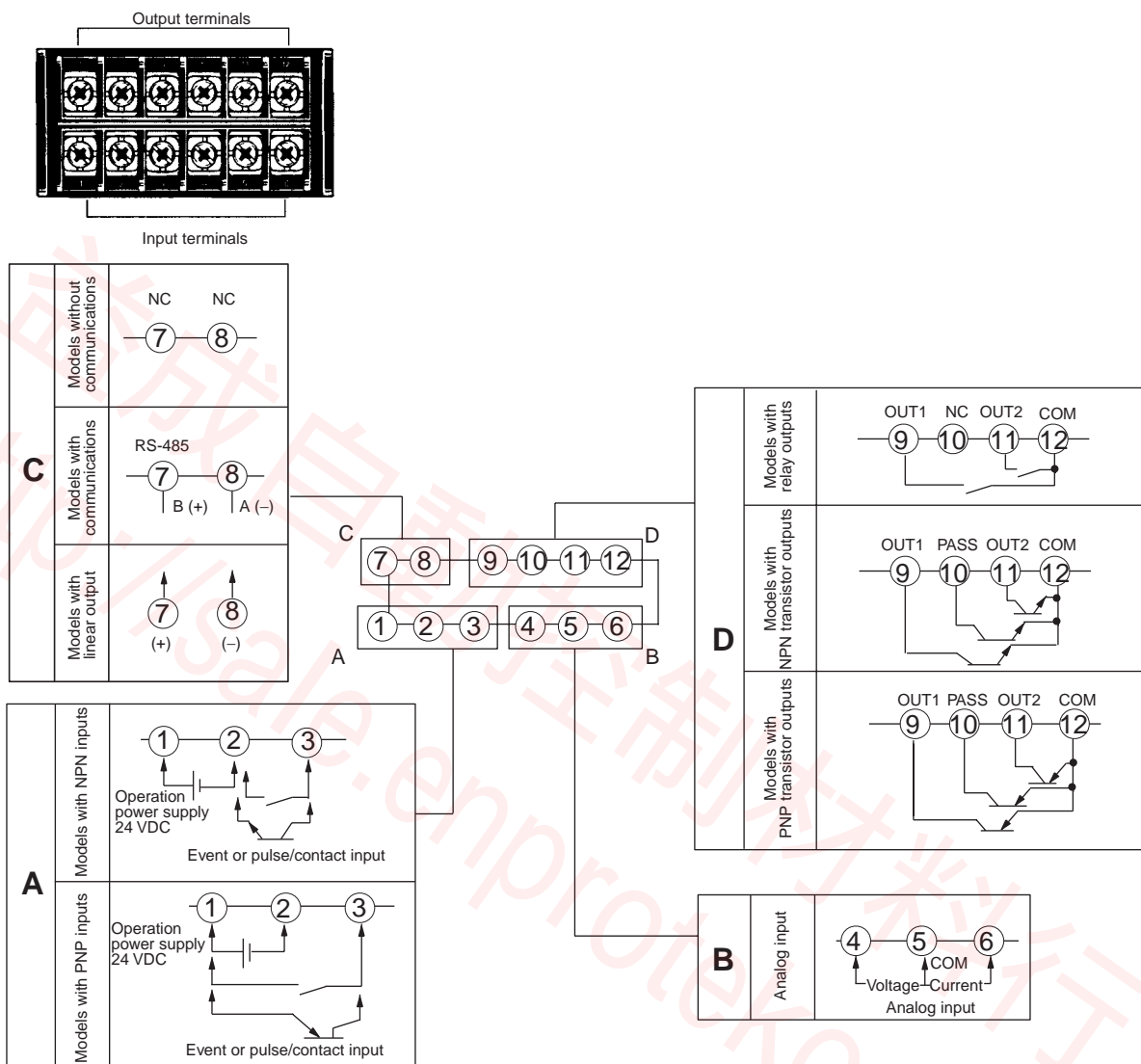
Terminal No.	Name	Description
①-②	Operation power	Connect the operation power supply.
③-② ③-①	Event input or pulse/contact input	Operates as follows depending on parameter setting: • Holds process value. • Calibrate the process value to zero and clear the forced-zero function. • Pulse or contact input.
④,⑥-⑤	Analog input	Connect the voltage or current analog input.
⑦-⑧	Communications	RS-485 communications terminals.
	Linear output	0 to 20 mA DC, 4 to 20 mA DC
		0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC
⑨,⑪-⑫ ⑨,⑩,⑪-⑫	Outputs	Outputs relay or transistor outputs. There is also a PASS output for models with transistor outputs.

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■ Block Diagram
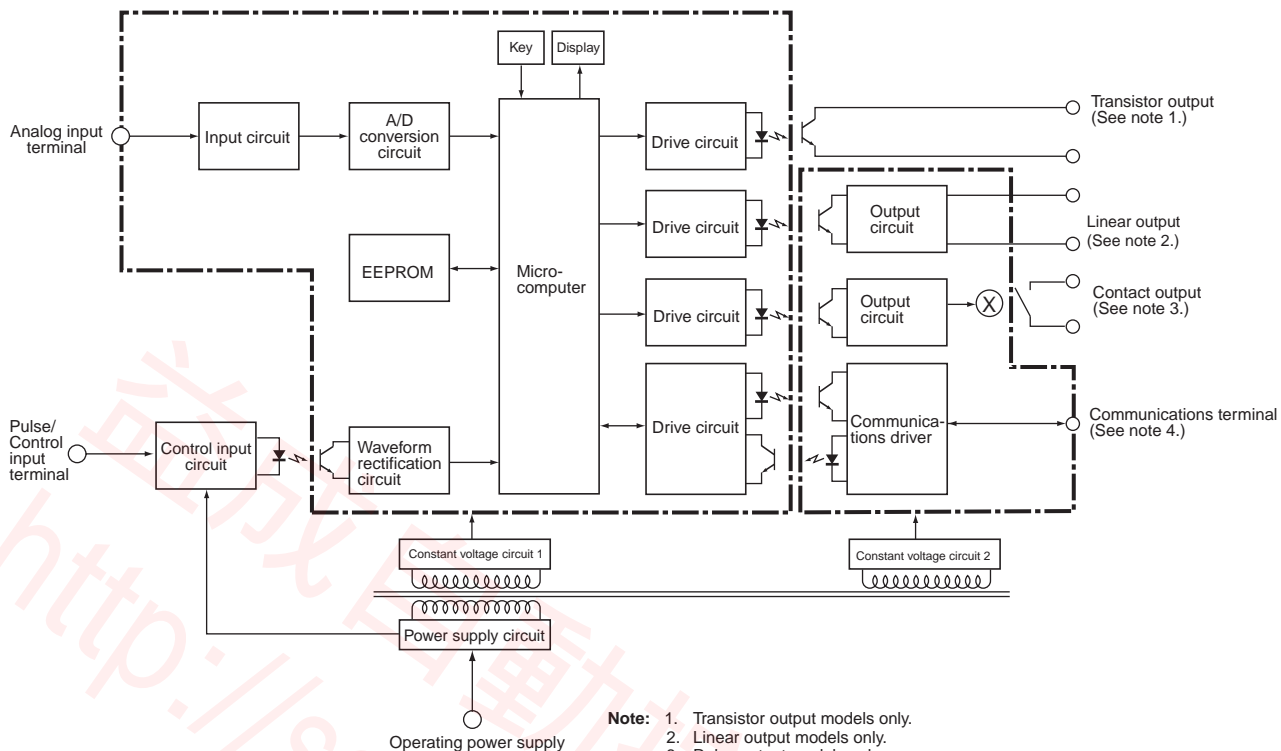
Note:
1. Transistor output models only.
2. Linear output models only.
3. Relay output models only.
4. Models with communications functions only.

■ Input Circuits

Analog Input (DC Voltage/Current)

Use terminal 5 for analog common.
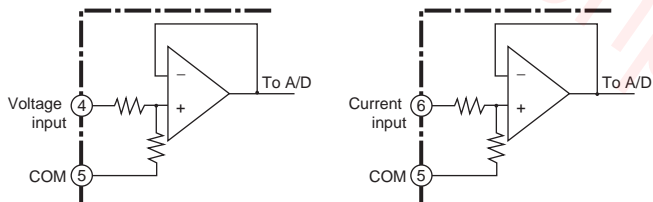
Comparative Output

Contact Output
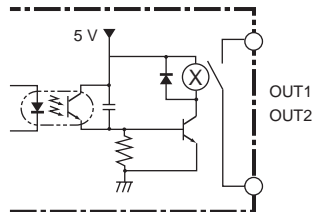
Transistor Output

NPN Output
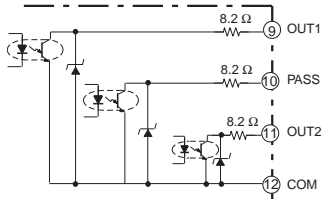
PNP Output
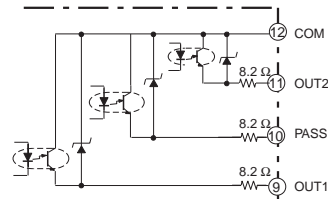
Pulse Input/Control Event Input (HOLD/ZERO)

• Use terminal 2 for the common terminal.
• Use the NPN open collector or the no-voltage contacts for the control input.

NPN Input

PNP Input

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Linear Output

Linear voltage output

Linear current output

5 kΩ min.

500 Ω max.
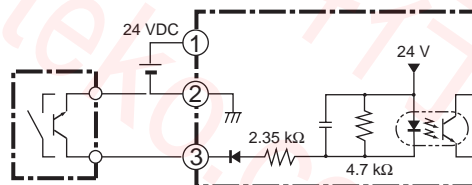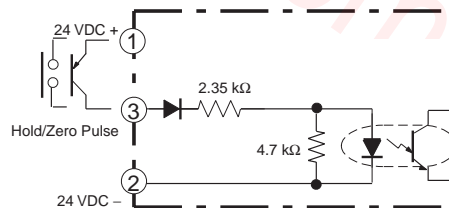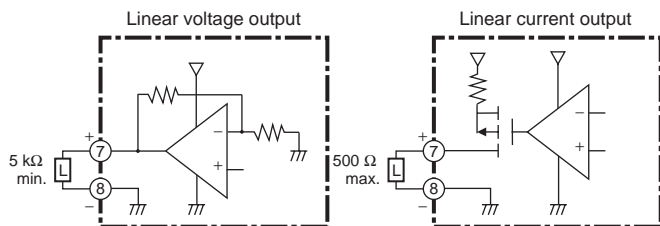
Note: The commons for linear output and transistor output on models with L1 and L2 are connected internally.
Depending on how the common is wired for externally connected devices, unwanted current paths for the linear output signal in the circuit may prevent the output signal from being output.
When connecting an external device, externally connect a relay to the transistor output or provide another means of insulation.

Operation

■ Main Functions

Scaling

The K3GN includes a scaling function that can convert the input signal to a desired value and display that value.

The displayed values can be freely adjusted to shift values, to create reversed displays, or to create positive/negative displays.
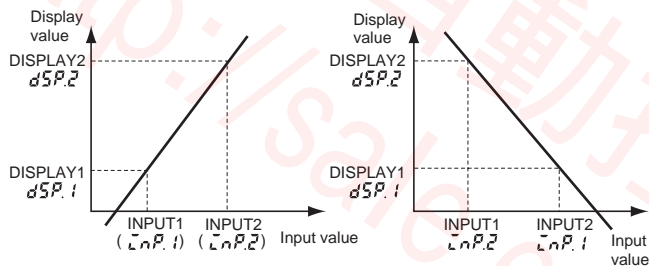
Teaching

Teaching is used when using scaling or setting comparative set values to set the present measurement values as the set values instead of inputting with the Shift and Up/Zero Keys. Teaching is useful for making settings while checking the operation status of the K3GN.

Average Processing

Average processing can be performed for measurement values using four levels (OFF, 2 times, 4 times, or 8 times). Average processing stabilizes displayed values by averaging the corresponding input signals that fluctuate dynamically. Select the appropriate number of averaging times depending on the application.

Forced-zero Function

It is possible to shift from a value to the zero point with one touch of the Up/Zero Key on the front panel (for example, when adjusting reference values).

Note: This function can be used only when forced-zero operation protection is released.
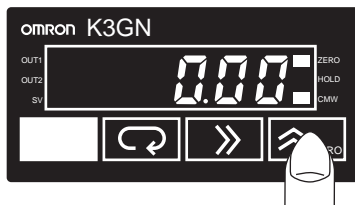
Changing the Display Color

The color of the value displayed can be set to either red or green. Make the setting according to the purpose and application of the equipment in which the K3GN is installed. The display color can also be set to change from green to red, or from red to green, according to the status of the comparison criteria.

Output Type Selection

Output operation for comparative set values can be freely selected.
Upper limit: Output ON if the measurement value ≥ comparative set value.
Lower limit: Output ON if the measurement value ≤ comparative set value.
Upper/lower limit: Output ON if the measurement value ≥ comparative upper-limit set value or if the measurement value is ≤ the comparative lower-limit value.

Key Protection

Key protection is used to restrict changes to displays and settings using the front panel keys and to restrict menu display and movement of operation levels. This function is effective for preventing misuse during operation.

Startup Compensation Time (Rotary Pulse Input Only)

The startup compensation time parameter keeps the measurement operation from sending an unnecessary output corresponding to instantaneous, fluctuating input from the moment the K3GN is turned ON until the end of the preset period.
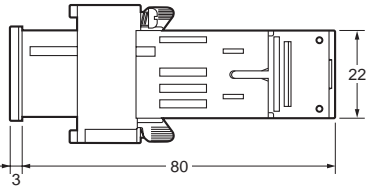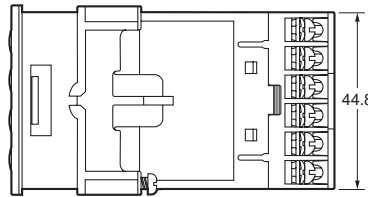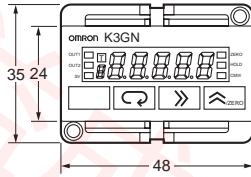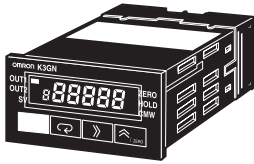
Hysteresis

The hysteresis of comparative outputs can be set to prevent the chattering of relay or transistor outputs.
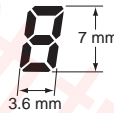
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Dimensions

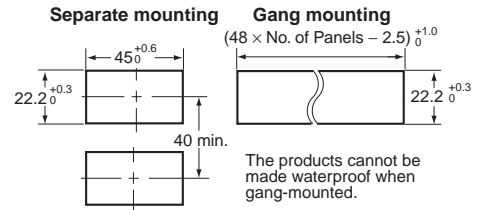**Note:** All units are in millimeters unless otherwise indicated.

K3GN

44.8

35 24

48

22

3   80

The K3GN uses M3 terminals. A terminal cover is provided.

Panel Cutout Dimensions

Separate mounting   **Gang mounting**
(48 × No. of Panels − 2.5) $_0^{+1.0}$

$45_0^{+0.6}$

$22.2_0^{+0.3}$

40 min.

$22.2_0^{+0.3}$

The products cannot be made waterproof when gang-mounted.

- For installation, insert the K3GN panel into the rectangular hole, insert the adaptor from the rear, and push it in to reduce the gap between the panel surface and the adaptor. Secure the Unit with the screws. For water-proof installation, insert the rubber gasket onto the body of the K3GN.
- If multiple mounted Units are used, make sure the ambient temperature for the K3GN does not exceed the specified temperature.

Main Display Character Size

7 mm

3.6 mm

■ Wiring Precautions

- Wire the power supply with the correct polarity. Wiring with incorrect polarity may result in damage or burning.
- Wire the terminals using crimp terminals.
- Tighten terminal screws to a torque of approx. 0.5 N·m.
- Wire signal lines and power lines separately to reduce the influence of noise.

■ Wiring

Power Supply

- Input 24 VDC to terminals 1 and 2.

①

24 VDC

②
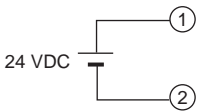
- Use M3 crimp terminals of the type shown below.

5.8 mm max.

5.8 mm max.

Measurement Input

The following table shows the relation between input ranges and input terminals.

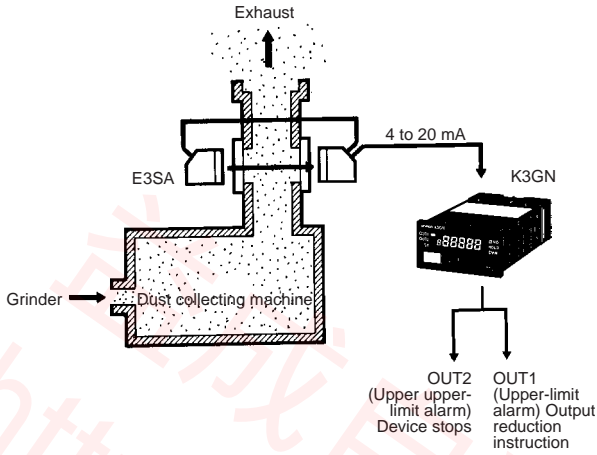| Input range		Input terminals
DC voltage/DC current	4 to 20 mA	⑤-⑥
	1 to 5 V	④-⑤
	±5 V	
	±10 V	
No-voltage contacts and NPN open collector (Models with NPN inputs)		②-③
No-voltage contacts and PNP open collector (Models with PNP inputs)		①-③

Be sure to read the Precautions for Correct Use and other information required when using the K3GN in the following user's manual.
K3GN Digital Panel Meter User's Manual (Cat.No. N102)
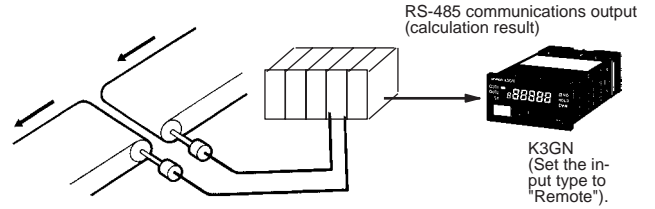
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■ Application Examples

Detection of Dust Exhaust

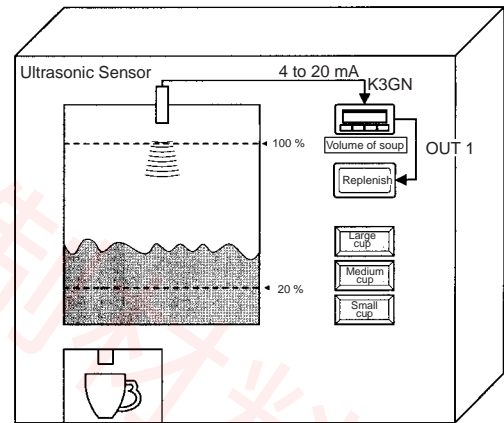The change in the density of the dust is detected via the E3SA and discriminated by the K3GN.

Monitoring of Tank Pressure

The output of the pressure sensor is processed and the pressure is displayed. Remote monitoring of the operation is possible with the communications function.

Monitoring of Motor Load Current

If the startup time compensation of the K3GN is enabled, the K3GN will not be influenced by the inrush current from starting the motor, and no signal will be output from the K3GN.

Monitoring Difference between Two Line Speeds

The difference between the two line speeds is calculated by the PLC and the result is written via RS-485 to the K3GN where it is displayed.
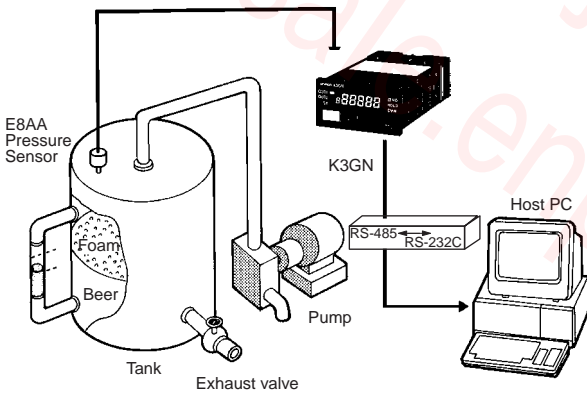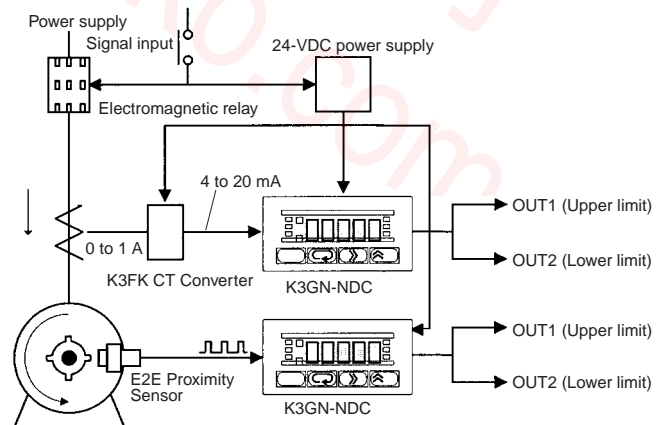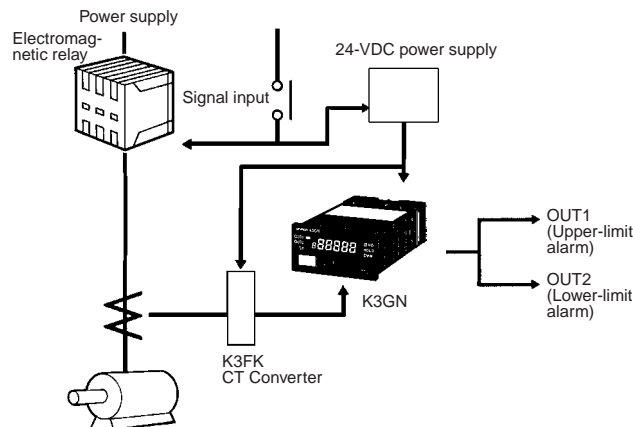

Monitoring the Remaining Quantity of Soup

The distance to the surface of the soup is detected with an ultrasonic sensor and, based on this distance, the K3GN displays the remaining quantity. When the remaining quantity of soup decreases to less than 20%, the K3GN lights the "Replenish" indicator.

Monitoring Number of Motor Revolutions

1/32 DIN Digital Panel Meter **K3GN**   13

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Safety Precautions

⚠ CAUTION

Do not touch the terminals while power is being supplied. Doing so may possibly result in electric shock.

Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings to enter the product. Doing so may occasionally result in minor or moderate injury or in property damage due to electric shock, fire, or malfunction caused by internal short circuiting.

Do not use the product in locations where flammable or explosive gases are present. Doing so may occasionally result in minor or moderate explosion, causing minor or moderate injury, or property damage.

Do not use the equipment for measurements within Measurement Categories II, III, or IV (according to IEC 61010-1). Doing so may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. Use the equipment for measurements only within the Measurement Category for which the product is designed.

Failure to perform correct setting of the product according to the application may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. Ensure safety in the event of product failure by taking safety measures, such as installing a separate monitoring system.

Product failure may occasionally prevent operation of comparative outputs, resulting in damage to the connected facilities and equipment. Ensure safety in the event of product failure by taking safety measures, such as installing a separate monitoring system.

Tighten the screws on the terminal block and the connector locking screws securely using a tightening torque within the following ranges. Loose screws may occasionally cause fire, resulting in minor or moderate injury, or damage to the equipment.

Terminal block screws: 0.43 to 0.58 N·m

Do not attempt to disassemble, repair, or modify the product. Doing so may occasionally result in minor or moderate injury due to electric shock.

■ Precautions for Safe Use

Environmental Precautions

1. Do not use the product in the following locations.
- Locations subject to direct radiant heat from heating equipment
- Locations where the product may come into contact with water or oil
- Locations subject to direct sunlight
- Locations where dust or corrosive gases (in particular, sulfuric or ammonia gas) are present
- Locations subject to extreme temperature changes
- Locations where icing or condensation may occur
- Locations subject to excessive shocks or vibration

2. Do not use the product in locations subject to temperatures or humidity levels outside the specified ranges or in locations prone to condensation. If the product is installed in a panel, ensure that the temperature around the product (not the temperature around the panel) does not go outside the specified range. Parts life is dependent on temperatures. A part life shortens when the temperature rises, and it lengthens when the temperature falls. Parts life can be lengthened by lowering the temperature inside the product.

3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or in the same cable as power lines. Other measures for reducing noise include running lines along separate ducts and using shield lines.

4. Do not install the product near devices generating strong high-frequency waves or surges. When using a noise filter, check the voltage and current and install it as close to the product as possible. If several products are mounted side-by-side or arranged in a vertical line, the heat dissipation will cause the internal temperature of the product to rise, shortening the service life. If necessary, cool the products using a fan or other cooling method.

5. Take care when cleaning the product, because the exterior of the product may be damaged by organic solvents (thinner, benzine, etc.), strong alkaline materials and strong acid materials.

6. Avoid storing in high humidity or in a corrosive gas environment (including during transportation)

Precautions for Safe Use

1. Use and store within the proper temperature and humidity described in the specifications.

2. Provide sufficient space around the product for heat dissipation.

3. When using the product stored unused over a year after purchasing, the product features may not be utilized sufficiently.

4. Avoid storing outdoors or in a place that receives direct sunlight (including during transportation).

5. The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact welding or burning.

6. Be sure to confirm the name and polarity for each terminal before wiring the terminal block and connectors. Faulty wiring may cause destruction or burnout of internal parts.

7. Use the product within the noted supply voltage and rated load.

8. Do not connect anything to unused terminals.

9. Output turns OFF when the mode is changed or settings are initialized. Take this into consideration when setting up the control system.

10. Install an external switch or circuit breaker and label them clearly so that the operator can quickly turn OFF the power.

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11. Ensure that the rated voltage is achieved no longer than 2 s after turning the power ON. When applying a voltage gradually, the power supply may not reset or the output may function in an uncertain manner.

12. Mount to a panel between 1 and 5 mm thick.

13. Use the specified size of crimp terminals (M3, width: 5.8 mm max.) for wiring. To connect bare wires, use AWG 28 to AWG 16 to wire the power supply terminals and AWG 22 to AWG 14 for other terminals. (Length of exposed wire: 6 to 8 mm)

14. Allow the product to operate without load for at least 15 minutes after the power is turned ON.

■ Precautions for Correct Use

1. Note that errors may be increased by the magnification of the scaling function.

2. When using a noise filter on the power supply, check that the filter is suitable for the supply voltage and current ratings, and then attach the noise filter as close as possible to the K3GN.
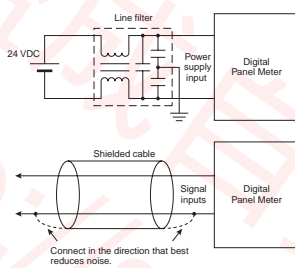
3. Avoid using the K3GN in places near a radio, television, or other wireless device. These devices can cause radio disturbances which will adversely affect the K3GN.