1/32 DIN Digital Panel Meter
K3GN

Compact, Intelligent Panel Meter Offers NEMA 4X Water Resistance, Optional Communications Interface

- Multi-purpose industrial process meter is ideal for many applications:
  - Process meter: 6 analog input ranges available: 4 to 20 mA, 0 to 20 mA; 1 to 5 VDC, 0 to 5 VDC; −5 to +5 VDC, −10 to +10 VDC
  - RPM processor/Tachometer: 5 kHz max. input pulse frequency range
  - Digital data display for PC or PLC (RS-485 communications)
- Scaling in a wide range of engineering units.
- Programmable output operation action, decimal point position setting, teaching function for input range, leading zero suppression and average processing.
- Advanced display features enhance operator comprehension
  - 5-digit display can be programmed to display red or green characters.
  - Display can be programmed to change color when an output turns on.
  - High-contrast backlit LCD display provides good legibility in most lighting conditions.
- High accuracy: ±0.1% full scale.
- Selectable outputs: 2 relay outputs, 3 transistor outputs, RS-485 communications.
- Compact 1/32 DIN size saves panel space and shallow mounting depth allows thinner control cabinets: measures 48 W x 24 H x 83 D mm (1.89 x 0.94 x 3.27 inches).
- Easy to configure from front panel or using Thermo Tools Software.

Ordering Information

■ Panel Meters

Stock Note: Shaded models are normally stocked.

Input type	Supply voltage	Output	Model	
			No communications	RS-485 communications
DC process signal or NPN pulse input	24 VDC	Dual relays (SPST-NO)	**K3GN-NDC 24VDC**	**K3GN-NDC-FLK 24VDC**
		Three NPN open collector	**K3GN-NDT1 24VDC**	**K3GN-NDT1-FLK 24VDC**
DC process signal or PNP pulse input		Dual relays (SPST-NO)	**K3GN-PDC 24VDC**	**K3GN-PDC-FLK 24VDC**
		Three PNP open collector	**K3GN-PDT2 24VDC**	**K3GN-PDT2-FLK 24VDC**

■ Programming Software

Stock Note: Shaded models are normally stocked.

Description	Model
Sets all panel meter parameters, initiates teaching function. Use with RS-485 communications models.	**Thermo Tools** (See Note)

Note: Contact Omron for current version information.

Specifications

■ Ratings

Supply voltage			24 VDC
Operating voltage range			85% to 110% of the rated supply voltage
Power consumption (See Note)			2.5 W max. (at max. DC load with all indicators lit)
Insulation resistance			20 MΩ min. at 500 VDC between external terminal and case. Insulation provided between inputs, outputs, and power supply.
Dielectric withstand voltage			1,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.
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		**Malfunction**	10 to 55 Hz, 10 min each in X, Y, and Z directions; acceleration: 9.8 m/s^2
		Destruction	10 to 55 Hz, 30 min each in X, Y, and Z directions; acceleration: 19.6 m/s^2
Shock resistance		**Malfunction**	Models with transistor outputs: 196 m/s^2 for 3 times each in X, Y, and Z directions Models with relay contact outputs: 98 m/s^2 for 3 times each in X, Y, and Z directions
		Destruction	294 m/s^2 for 3 times each in X, Y, and Z directions
Ambient temperature		**Operating**	−10°C to 55°C (14°F to 131°F) with no condensation or icing
		Storage	−25°C to 65°C (−13°F to 149°F) with no condensation or icing
Ambient humidity		**Operating**	25% to 85% with no condensation
Ambient atmosphere			Must be free of corrosive gas
EMC	**Emission Enclosure**		EN55011 Group 1 class A
	Emission AC Mains		EN55011 Group 1 class A
	Immunity ESD		EN61000-4-2: 4-kV contact discharge (level 2) 8-kV air discharge (level 3)
	Immunity-RF-interference		ENV50140: 10 V/m (amplitude modulated, 80 MHz to 1 GHz) (level 3) 10 V/m (pulse modulated, 900 MHz)
	Immunity Conducted Disturbance		ENV50141: 10 V (0.15 to 80 MHz) (level 3)
	Immunity Burst		EN61000-4-4: 2-kV power-line (level 3) 2-kV I/O signal-line (level 4)
Approved standards			UL Listed, File No. E41515 to UL508 standard CSA Certified, File No. LR67027 to CSA22.2 No. 142−M1987 standard Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC1010-1); conforms to VDE106/part 100 (finger protection) when the terminal cover is mounted.
Weight			Approx. 100 g

Note: 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.

■ Input/Output Ratings

Relay Contact Output

(Incorporating G6K Relays)

Load type	Resistive load ($\cos\phi = 1$)
Rated load	1 A at 30 VDC
Rated carry 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 times min. (at a switching frequency of 36,000 times/hr)
Electrical life (at an ambient temperature of 23°C)	100,000 times min. (at the rated load with a switching frequency of 1,800 times/hr)

Transistor Output

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

■ Communications (CompoWay/F)

Communications type		RS-485
Transmission 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 set values, read/write scaling values, enable/disable the writing of data through communications, forced-zero control, and other data.

Refer to *N102 Operation Manual* for more details.

■ Measuring Ranges

Process Voltage/Current Inputs

Input	Measuring range	Measuring accuracy	Input impedance	Displayable range
DC voltage	1.000 to 5.000 V/ 0.000 to 5.000 V	±0.1% FS ±1 digit max. at 23±3°C (73.4±5.4°F)	1 MΩ min.	-19999 to 99999 (with scaling function)
	-5.000 to 5.000 V	±0.1% FS ±1 digit max. at 23±5°C (73.4±9°F)		
	-10.00 to 10.00 V			
DC current	4.00 to 20.00 mA/ 0.00 to 20.00 mA	±0.1% FS ±1 digit max. at 23±3°C (73.4±5.4°F)	60 Ω	

No-voltage Contact/Open Collector Inputs

Input	Measuring range	Measuring accuracy at 23±5°C (73.4±9°F)	Displayable range
No-voltage contact (30 Hz max.) with ON/OFF pulse width of 16 ms min.	0.05 to 30.00 Hz	±0.1% FS ±1 digit max.	-19999 to 99999 (with scaling function)
Open collector (5 kHz max.) with ON/OFF pulse width of 90 μs min.	0.1 to 5000.0 Hz		

■ Digital Data Display (By RS-485 Communication)

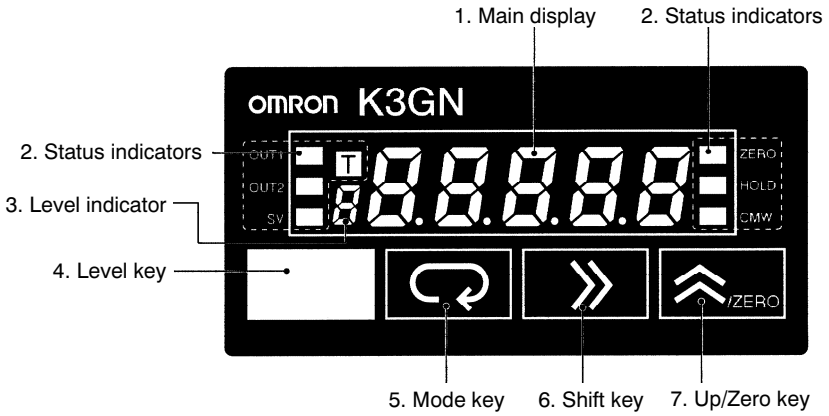
Displayable range	-19999 to 99999

■ Characteristics

Item	Process signal	Ratemeter/tachometer signal	Data display
Input signal	Process voltage (1 to 5 V, 0 to 5 V, −5 to +5 V, −10 to +10 V) Process current (4 to 20 mA, 0 to 20 mA)	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.)	Digital data display (by RS-485 communication)
A/D conversion method	Double integral method	---	
Sampling period	250 ms	---	
Display refresh period	Sampling period (sampling times multiplied by number of averaging times if average processing is selected.)		
Pulse measurement method	---	Periodic measurement	---
Connectable sensors	---	ON residual voltage: 2.5 V max. OFF leakage current: 0.1 mA max. Load current: Must have a switching capacity of 15 mA min. Must be able to reliably switch load currents of 5 mA max.	
Max. displayed digits	5 digits (−19999 to 99999)		
Display	7-segment digital display, character height: 7.0 mm (0.28 in)		
Polarity display	"−" is displayed automatically with a negative input signal		
Zero display	Leading zeros are not displayed		
Scaling function	Programmable with front-panel key inputs (range of display: −19999 to 99999). The decimal point position can be set as desired.		
External controls (See Note 1)	HOLD: Measurement value held ZERO: Forced zero	---	HOLD: Measurement value held ZERO: Forced zero
Hysteresis setting	Programmable with front-panel key inputs (0001 to 9999)		
Other functions	Programmable Color Display (red and/or green; display can change color when output turns on) Selectable output operating action Teaching set values Average processing (simple average) Lockout configuration Communications writing control (communications output models only)		
	Forced-zero set with front panel keys Control inputs (HOLD/ZERO) selection via front panel keys Field calibration	Startup compensation time (0.00 to 99.9 s) Auto-zero time (0.0 to 19.9 s)	Forced-zero set with front panel keys Control inputs (HOLD/ZERO) selection via front panel keys
Output	Relays: 2 SPST-NO Transistors: 3 NPN open collector 3 PNP open collector		---
	Combinations: Communications output (RS-485) + relay outputs (2 SPST-NO); Communications output (RS-485) + transistor outputs (3 NPN open collector); Communications output (RS-485) + transistor outputs (3 PNP open collector)		
Communications	Communications function: RS-485 (See Note 2)		
Delay in comparative outputs (transistor outputs)	750 ms max.		
Enclosure ratings	Front panel: NEMA 4X for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP20		
Memory protection	Non-volatile memory (EEPROM; possible to rewrite 100,000 times)		

Note: 1. The minimum input time for control signals is 80 ms.
2. Refer to *N102 Operation Manual* for more details.

Nomenclature

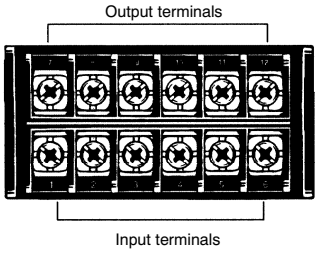


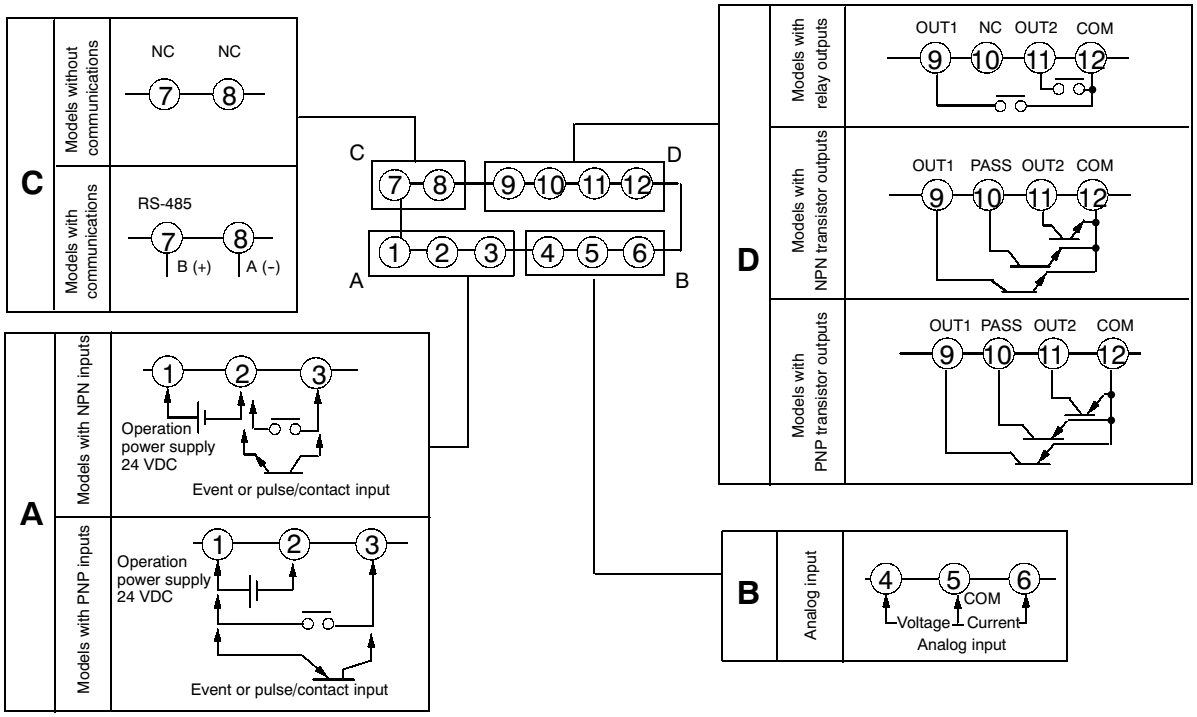
Name		Functions
1. Main display		Displays process values, parameters, and set values.
2. Status indicators	**OUT1**	Lit when output 1 is ON.
	OUT2	Lit when output 2 is ON.
	SV	Lit when a set value is being displayed or changed.
	T	Lit when the teaching function is enabled. Flashes when the K3GN is in 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

■ External Connections

Terminal Arrangement





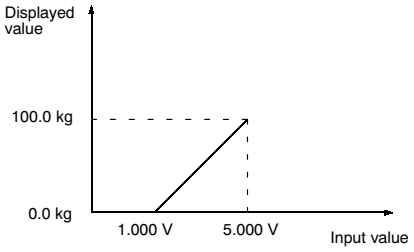
Terminal No.	Function	Description
①-②	Operation power	Connect the operation power supply.
③-②	Event input or pulse/contact input	Operates as follows depending on parameter setting: • Holds process value. • Calibrate the process value to zero and clear the forced-zero function. • Pulse or contact input.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

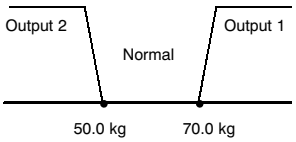
■ Process Meter Application

The initial settings required when using the K3GN a process meter are explained below using the following example.

Setting Example

Inputs in the range 1 to 5 V are scaled to the range 0 to 100.0 kg and displayed. If the measurement value goes over 70.0 kg, output 1 turns ON. If the measurement value goes below 50.0 kg, output 2 turns ON.





Initial Setting Procedure

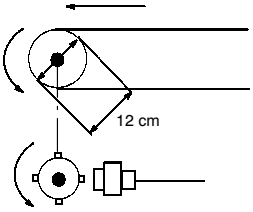
1. **Check the wiring and turn ON the power.**
2. **Set analog input as the input type.**
   If a measurement value is displayed (operation level), move to the initial setting level by holding down the Level Key for 3 s min.
   Set parameter *in-t* to *AnALG*.
3. **Set the analog range to 1 to 5 V.**
   Set parameter *rAnGE* to *1-5*.
4. **Set the scaling values.**
   Set parameter *inP.1* to *1.000*.
   Set parameter *dSP.1* to *0*.
   Set parameter *inP.2* to *5.000*.
   Set parameter *dSP.2* to *1000*.
5. **Set the position of the decimal point.**
   Set parameter *dP* to *oooo.o*.
6. **Operating action for OUT1 and OUT2 set values.**
   Set parameter *oUt 1.t* to *HI*.
   Set parameter *oUt2.t* to *Lo*.
7. **Set OUT1 set value to 70.0 and OUT2 set value to 50.0.**
   If an initial setting level parameter is displayed, press the Level Key for 1 s min. to return to the operation level.
   Set parameter *oUt 1* to *70.0*.
   Set parameter *oUt2* to *50.0*.
8. **Start actual operation.**

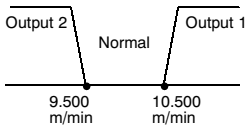
■ Tachometer Application

The initial settings required when using the K3GN as a tachometer are explained below using the following example.

Setting Example

The speed of a conveyor belt is displayed in m/min units. For every revolution of the shaft, 4 pulses are output. the diameter of the axis of rotation is 12 cm. If the Rotational speed goes over 10.500 m/min, output 1 turns ON. If the speed goes below 9.500 m/min, output 2 turns ON.





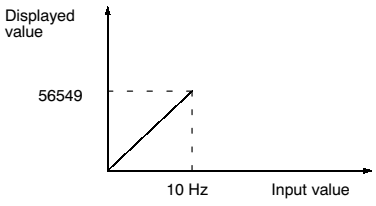
Deciding the Scaling Value

Rotational speed (m/min) = π × Diameter (m) × Revolutions per minute (rpm)
Revolutions per minute (rpm) = Input frequency (Hz) ÷ Number of pulses per revolution × 60

Applying the appropriate values to these 2 equations gives:
Speed (m/min) = 5.654866... × Input frequency (Hz)

Multiply by 1,000 to display the first 3 digits to the right of the decimal point.

Speed (m/min) = 5654.866... × Input frequency (Hz)



To limit inaccuracies due to scaling, select a round number (e.g., 10) as the input value and select a display value of as many digits as possible. In this example, scaling is performed so that an input value of 10 gives a displayed value of 56549.

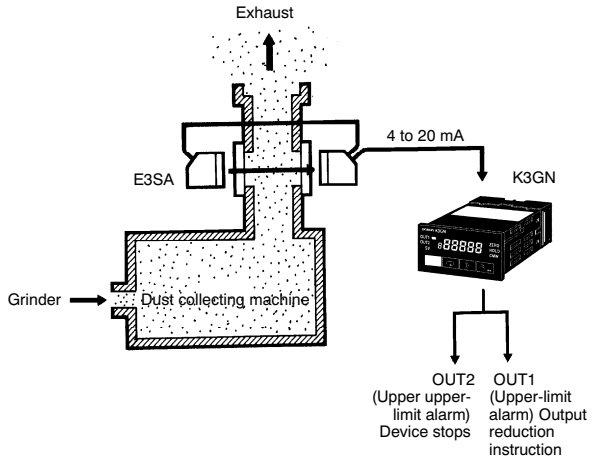
Initial Setting Procedure

1. **Check the wiring and turn ON the power.**
2. **Set pulse input as the input type.**
   If a measurement value is displayed (operation level), move to the initial setting level by holding down the Level Key for 3 s min.
   Set parameter *in-t* to *PULSE*.
3. **Set the pulse frequency to 30 Hz.**
   The input pulse frequency for the application is approximately 2 Hz and so can be assumed not to exceed 30 Hz. Set parameter *P-FrE* to *30*.
4. **Set the scaling values.**
   Set parameter *inP* to *10*.
   Set parameter *dSP* to *56549*.
5. **Set the decimal point.**
   Set parameter *dP* to *oo.ooo*.
6. **Operating action for OUT1 and OUT2 set values.**
   Set parameter *oUt 1.t* to *HI*.
   Set parameter *oUt2.t* to *Lo*.
7. **Set OUT1 set value to 10.500 and OUT2 set value to 9.500.**
   If an initial setting level parameter is displayed, press the Level Key for 1 s min. to return to the operation level.
   Set parameter *oUt 1* to *10.500*.
   Set parameter *oUt2* to *9.500*.
8. **Start actual operation.**

■ Application Examples

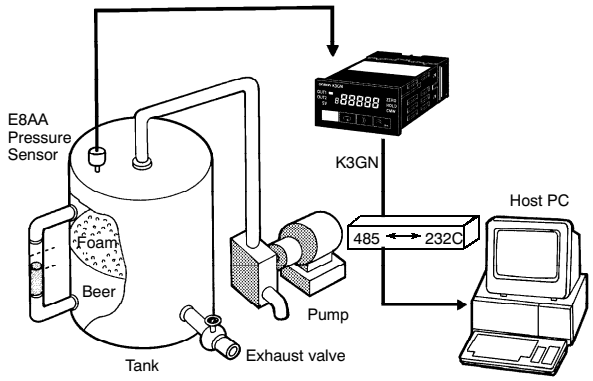
Detection of Dust Exhaust

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



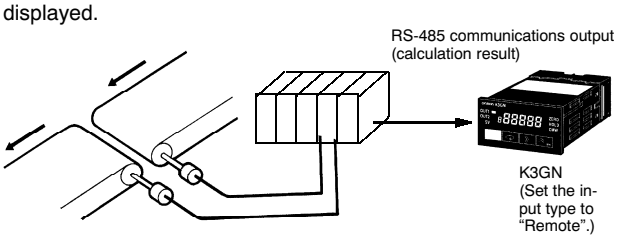
Monitoring of Tank Pressure

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



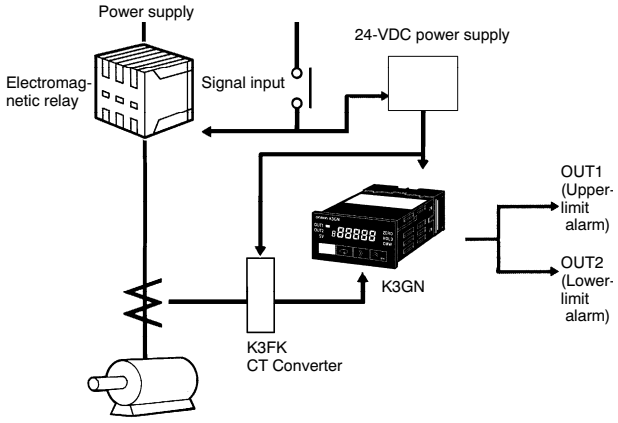
Monitoring Difference between Two Line Speeds

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.



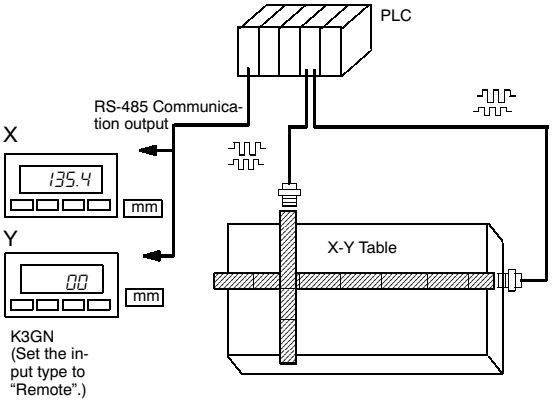
Monitoring of Motor Load Current

The K3GN can monitor the current of a motor and warn of excessive motor loads. 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.



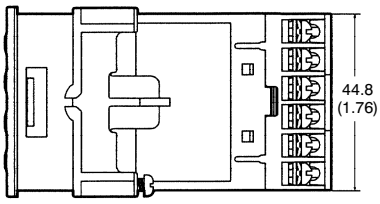
Position Indication on X-Y Table

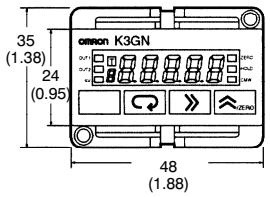
The position on the X-Y table is calculated by the PLC and the result is written via RS-485 to the K3GN where it is displayed. The scaling function can be used to display the result in millimeter units.

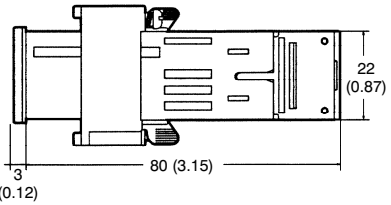


Dimensions

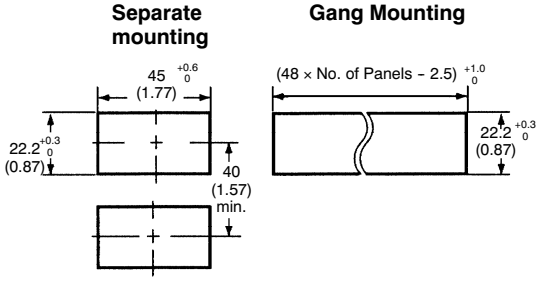
Unit: mm (inch)





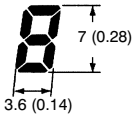


Panel Cutouts



Note: The panel meters cannot be made waterproof when gang-mounted.

Main Display Character Size



Precautions

⚠ WARNING

Do not touch the terminals while power is being supplied. Electrical shock may result. Also, do not touch the terminals with a screwdriver while power is being supplied. Electrical shock may result via the screwdriver.

Do not allow pieces of metal or wire clippings to enter the product. Electrical shock, fire, or malfunction may result.

⚠ Caution

Do not attempt to disassemble, repair, or alter the product. Electrical shock, fire, or malfunction may result.

Do not use the product where flammable or combustible gasses are present.

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.

Always maintain the load within ratings. Damage or burning may result if the ratings are exceeded.

Always maintain the power supply voltage within specifications. Damage or risk of fire may result if the specifications are exceeded.

Tighten the terminal screws securely. The recommended tightening torque is 0.5 N • m. Loose screws may result in product failure or malfunction.

Perform correct setting of the product according to the application. Failure to do so may cause unexpected operation, resulting in damage to the unit or injury.

This product is not a safety device. Product failure may prevent operation of comparative outputs. Take safety measures, such as installing a separate monitoring system, to ensure safety and to prevent serious accidents caused by such failure, thus ensuring safety.

Observe the following precautions to ensure safety:

1. Do not connect anything to unused terminals.
2. Be sure to check each terminal for correct number and polarity before connection. Incorrect or reverse connection may damage or burn out internal components of the K3GN.
3. Do not use the product in locations subject to the following:
   - Dust or explosive gasses (e.g., sulfuric gas or ammonia gas).
   - Condensation or icing as a result of high humidity.
   - Outdoors or in direct sunlight.
   - Splashing liquid or oil atmosphere.
   - Direct radiant heat from heating equipment.
   - Extreme changes in temperature.
4. Do not block heat dissipation around the product, i.e., provide sufficient space for heat dissipation. Do not block the ventilation holes on the back of the product.
5. Do not use paint thinner for cleaning. Use commercially available alcohol.
6. Use a power supply meeting the power supply specifications of the K3GN. Be sure that the rated voltage is achieved within 2 s after turning ON the power.
7. Use the K3GN within the specified temperature and humidity ranges. When installing the K3GN in a panel, be sure that the temperature around the K3GN (not the temperature around the panel) does not exceed 55°C (131°F). If the K3GN is subject to radiant heat, be sure that the temperature of the surface of the K3GN exposed to the radiant heat does not exceed 55°C (131°F) by providing a fan or other heat removal method.
8. Store the K3GN within the specified temperature and humidity ranges.
9. Do not lay heavy objects on the product during use or storage. Doing so may deform or deteriorate the K3GN.
10. Conduct aging for 15 minutes min. after power is ON for correct measurement.

Mounting

Recommended panel thickness is 1 to 5 mm (0.04 to 0.20 inch).

Insert the K3GN in the square cutout, insert the adapter from the back, and push the K3GN into the cutout as far as possible. Use screws to secure the K3GN. To make the K3GN waterproof, insert watertight packing in the K3GN.

Install the watertight packing in the proper direction. Note that the packing is direction-sensitive.

When gang-mounting two or more products in a cutout, be sure that the ambient temperature does not exceed the specifications.

Mount the K3GN as horizontally as possible.

Separate the K3GN from machines generating high-frequency noise, such as high-frequency welding machines and high-frequency sewing machines.

Operation

A K3GN model with a relay contact or transistor output may not output any alarm signal normally if the model has an error. It is recommended that an independent alarm device be connected to the model.

The parameters are factory-set so that the K3GN will operate normally. The settings of the parameters may be changed according to the application.

Wiring

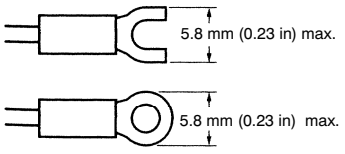
Wire the power supply with the correct polarity. Wiring with incorrect polarity may result in damage or burning.

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 electrical noise and interference.

Use M3 crimp terminals of the type shown below.



■ Troubleshooting

When an error occurs, error details will be displayed on the main display. Confirm the error from the main display and take the appropriate countermeasures.

Main display	Level display	Error contents	Countermeasure
E111 (E111)	Not lit	RAM memory error	Turn the power supply OFF and ON again. If the same error is displayed even after the power is turned OFF and ON, it is necessary to replace the memory. If normal operation is restored by turning the power supply OFF and ON, it is possible that there is noise interference. Check that there is nothing in the vicinity that may be the source of noise.
E111 (E111)	5	EEPROM memory error	
S.Err (S.Err) (Flashes at 0.5-s intervals)	Not lit	Input error	Check for incorrect input wiring, for disconnected power lines, for short-circuiting, and the input type.
99999 (Flashes at 0.5-s intervals)	Not lit	Greater than displayable range	This is not an operational error. These messages are displayed when a value to be displayed lies outside the displayable range, even if the input value is within the input range and the range for which measurement is possible. Bring the input value and display value within range.
-19999 (Flashes at 0.5-s intervals)	Not lit	Less than displayable range	

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