

Appendix A

Specifications

Ratings

Supply voltage	100 to 240 VAC (50/60 Hz); 12 to 24 VDC
Operating voltage range	85% to 110% of supply voltage
Power consumption (see note)	15 VA max. (max. AC load with all indicators lit) 10 W max. (max. DC load with all indicators lit) (see note)
Sensor power supply	80 mA at 12 VDC \pm 10%
Insulation resistance	20 M Ω min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.
Dielectric withstand voltage	2,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.
Noise immunity	\pm 1,500 V on power supply terminals in normal or common mode \pm 1 μ s, 100 ns for square-wave noise with 1 ns
Vibration resistance	Malfunction: 10 to 55 Hz, 0.5-mm for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 0.75-mm for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction: 98 m/s ² (10G) for 3 times each in X, Y, and Z directions Destruction: 294 m/s ² (30G) for 3 times each in X, Y, and Z directions
Ambient temperature	Operating: -10°C to 55°C (with no icing) Storage: -20°C to 65°C (with no 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	UL508, CSA22.2; 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. 400 g

Note An Intelligent Signal Processor with DC supply voltage requires approximately 1 A DC as control power supply current the moment the Intelligent Signal Processor is turned on. Do not forget to take this into consideration when using several Intelligent Signal Processors. When the Intelligent Signal Processor is not in measuring operation (e.g., the Intelligent Signal Processor has been just turned on or is operating for start-up compensation time), the display will read "00000" and all outputs will be OFF.

Input/Output Ratings

Relay Contact Output

(Incorporating a G6B Relay)

Item	Resistive load ($\cos\phi = 1$)	Inductive load ($\cos\phi = 0.4$, $L/R = 7$ ms)
Rated load	5 A at 250 VAC; 5 A at 30 VDC	1.5 A at 250 VAC, 1.5 A at 30 VDC
Rated carry current	5 A max. (at COM terminal)	
Max. contact voltage	380 VAC, 125 VDC	
Max. contact current	5 A max. (at COM terminal)	
Max. switching capacity	1,250 VA, 150 W	375 VA, 80 W
Min. permissible load (P level, reference value)	10 mA at 5 VDC	
Mechanical life	50,000,000 times min. (at a switching frequency of 18,000 times/hr)	
Electrical life (at an ambient temperature of 23°C)	100,000 times min. (at a rated load switching frequency of 1,800 times/hr)	

Transistor Output

Rated load voltage	12 to 24 VDC $+10\%/-15\%$
Max. load current	50 mA
Leakage current	100 μ A max.

BCD Output

I/O signal name		Item	Rating
Inputs	REQUEST, HOLD, MAX, MIN, RESET	Input signal	No-voltage contact input
		Input current with no-voltage input	10 mA
		Signal level	ON voltage: 1.5 V max. OFF voltage: 3 V min.
Outputs	DATA, POLARITY, OVERFLOW, DATA VALID, RUN	Rated load voltage	12 to 24 VDC $+10\%/-15\%$
		Max. load current	10 mA
		Leakage current	100 μ A max.

Note Logic method: negative logic

Linear Output

Item	4 to 20 mA	1 to 5 V	1 mV/10 digits (see note)
Resolution	4,096		
Output error	$\pm 0.5\%$ FS		$\pm 1.5\%$ FS
Permissible load resistance	600 Ω max.	500 Ω min.	1 K Ω min.

Note For the 1 mV/10-digit output, the output voltage changes for every 40 to 50 increment in the display value.

Communications

Item		RS-232C, RS-422	RS-485
Transmission method		4-wire, half-duplex	2-wire, half-duplex
Synchronization method		Start-stop synchronization	
Baud rate		1,200/2,400/4,800/9,600/19,200/38,400 bps	
Transmission code		ASCII (7-bit)	
Communications	Write to K3NR	Comparative set value, prescaling value, remote/local programming, reset control of maximum/minimum values, and other setting mode items excluding communications conditions.	
	Read from K3NR	Process value, comparative set value, maximum value, minimum value, model data, error code, and others	

For details, refer to *Communication Operation Manual*.

Characteristics

Input signal	No-voltage contact (30 Hz max., ON/OFF pulse width: 15 ms min.) Voltage pulse (50 kHz max., ON/OFF pulse width: 9 μ s min., ON voltage: 4.5 to 30 V/OFF voltage: -30 to 2 V) Open collector (50 kHz max., ON/OFF pulse width: 9 μ s min.) Connectable Sensors ON residual voltage: 3 V max. OFF leakage current: 1.5 mA max. Load current: Must have switching capacity of 20 mA min. Must be able to dependably switch a load current of 5 mA max.
Measuring accuracy (at 23\pm5°C)	Operating modes 1 and 6: $\pm 0.006\% \text{rdg} \pm 1$ digit Operating modes 2 to 5: $\pm 0.02\% \text{rdg} \pm 1$ digit
Measuring modes and ranges (Operating modes 1 to 6 are for no-contact sensor models)	Operating mode 1: Rotational/circumferential speed 0.0005 to 50,000 Hz Operating mode 2: Absolute ratio 0.0005 to 50,000 Hz Operating mode 3: Error ratio 0.0005 to 50,000 Hz Operating mode 4: Rotational difference 0.0005 to 50,000 Hz Operating mode 5: Flow rate ratio 0.0005 to 50,000 Hz Operating mode 6: Passing time 0.0005 to 50,000 Hz Operating mode 7: Pulse counting 0 to 4G count (32-bit counter)
Max. displayed digits	5 digits (-19999 to 99999)
Display	7-segment LED
Polarity display	"-" is displayed automatically with a negative input signal.
Zero display	Leading zeros are not displayed.
Prescale function	Programming via front-panel key inputs. (0.0001 $\times 10^{-9}$ to 9.9999 $\times 10^9$, decimal point can be set freely) Can be set using prescale value teaching.
HOLD functions (see note 2)	Max. value (peak) hold, Min. value (bottom) hold
External control	HOLD (Process value held) RESET (Maximum/minimum data reset, counting value reset) BANK (Selection of one bank out of 4 banks of set values) (Selection of one bank out of 4 banks of prescale values)
Comparative output hysteresis setting	Programmable with front-panel key inputs (1 to 9999).
Other functions	Variable linear output range (for models with linear outputs only) Remote/Local processing (available for communications output models only) Maximum/Minimum value data reset with front panel keys Comparative output pattern selection Process time for averaging measured values Startup compensation time (0.0 to 99.9 s) Time unit display Security Memory power failure
Output configuration	Relay contact output (5 outputs) Transistor output (NPN and PNP open collector), BCD (NPN open collector) Parallel BCD (NPN open collector) + transistor output (NPN open collector) Linear output (4 to 20 mA, 1 to 5 V) + transistor output (NPN open collector) Communication functions (RS-232C, RS-485, RS-422) Communication functions (RS-232C, RS-485, RS-422) + transistor output (NPN open collector)
Delay in comparative outputs (at transistor output)	Operating modes 1 to 6: 200 ms max. Operating mode 7: 1 ms max.
Enclosure rating	Front panel: NEMA4 for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00
Memory protection	Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)

- Note**
1. The linear output range cannot be set when connected to a 1 mV/10-digit Linear Output Board.
 2. Not effective for operating mode 7.