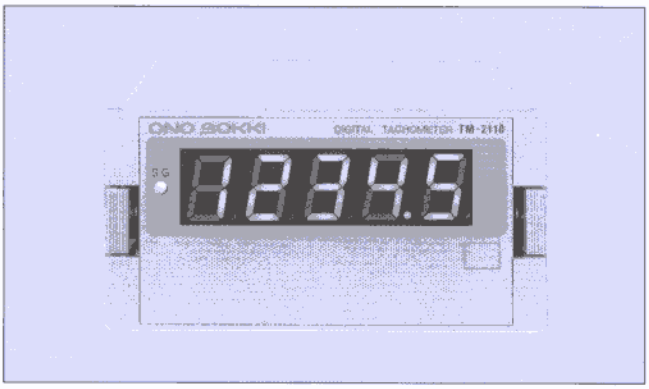
DIGITAL TACHOMETERS

TM-2100 series

The TM-2100 series are compact and light-weight digital tachometers, which size conforms to DIN standards (96 × 48 mm).

- *Sudden deceleration follow-up function is provided, by which even in a case of sudden stop, the display is reset to zero in a short time.*
- *Calculation function by microcomputer is usable for rpm and line speed flow measurement and for controlling, etc.*

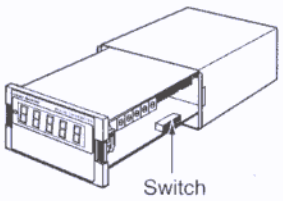
TM-2110 Basic Type Tachometer



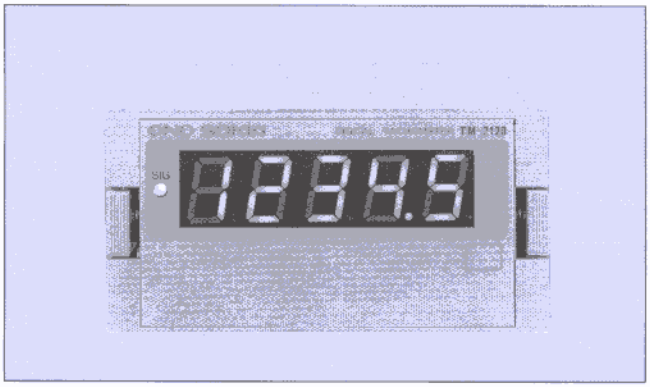
- Basic type tachometer for measurement and display
- Wide range of measurement from low rpm to high rpm
- Suitable for almost all the rotational detectors of ONO SOKKI

< Various Functions — Common to all types >

- **Unit Conversion Function**
  Direct reading of the rotational speed regardless of the number of pulses received per rotation.
  Internal switches make all the settings, which prevents an unexpected reset by mistake.
- **Sudden Deceleration Follow-up Function**
  At the time of sudden stop, the display is reset to zero in a short time.
- **Worldwide Power Supply**
  Usable from 100VAC to 240VAC without any conversion



TM-2120 with BCD Output



- Five-digit BCD output
- Connected with a printer, a PC, etc. for digital processing
- Output mode is changeable between normal mode and request mode.
  - Normal mode: Print commands and BCD data are output approximately every one sec. consecutively.
  - Request mode: When a request is received from an external devices, BCD data is output (tri-State).

< BCD Output Specification >

■ Output Signal

BCD output

Output type:	Positive logic 5-digit parallel output
Output level:	"Hi" 4.4 to 5.25V
	"Lo" 0 to 0.1V
Output current:	4mA max. (fanout 2)

Print command output

Output type:	Negative logic pulse (width: approx. 10ms)
Output level:	"Hi" 4.4 to 5.25V
	"Lo" 0 to 0.1V
Output current:	4mA max. (fanout 2)

■ Input Signal

Request signal

Output type:	Negative logic pulse (width: 10μs min.)
Operation edge:	Falling edge
Input level:	TTL level
Input current:	0.5mA max. (Sinking current)

■ Output Mode

Mode selection: Changeable between normal and request

Common Specifications

■ Input Section

Input Connection:	M3 free terminal screws
Input impedance:	30kΩ min. (at 20kHz)
Input amplification format:	AC or DC*1 (switchable)
Connectable detectors:	Electromagnetic/Magnetoelectric/Optoelectronic detectors, Rotary encoders, Proximity switches

*1...Input Amplification specifications

•AC amplifier

Signal waveform:	sine or rectangular wave
Signal voltage range:	sine wave: 0.2 to 45Vrms
	Rectangular wave: 0.6 to 63Vp-p
Signal frequency range:	1Hz to 20kHz

•DC amplifier

Signal waveform:	Rectangular wave with pulse width of 20μs min.
Signal voltage range:	Hi level: +4 to 30V
	Low level: −1 to +1V
	* By changing a bit switch, open collector or dry contact input will be possible.
Signal frequency range:	0.1Hz to 20kHz
Low pass filter:	Cut off frequency; Approx. 100Hz
	Attenuation; Approx. −40dB at 20kHz
	(switchable on/off by a bit switch)

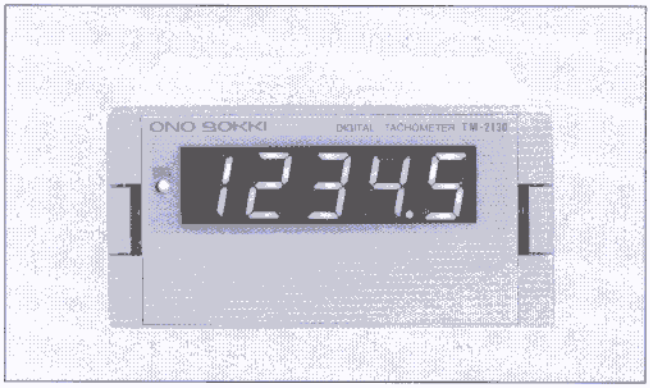
■ Direct Reading Calculation Functions

Factor setting section:	• Multiplier section
	Setting range: 0.0001 to 9.9999 (5-digit setting by rotary switches)
	• Exponent section
	Setting range: ×10, ×1, ×1/10, ×1/100 (setting by bit switches)
Decimal point setting section:	0.0, 0.00, 0.000 or no decimal point (setting by bit switches)

■ Calculation Section

Measurement error:	Display value × (±0.02%) ±1 count or less
	* The display value here is a counted value with the decimal point ignored.
Measurement method:	Periodic calculation method
Range setting switch:	• Wide range: 0.1Hz to 20kHz
	* With no input signal for 11 sec. min., frequency (display) turns to zero.

TM-2130 with Analogue Output



- Voltage and current signal is output corresponding to the input frequency.
- Connectable to analogue meters, recorders and many types of control equipment.
- F/V circuit is used for the analogue output.

< Analogue Output Specifications >

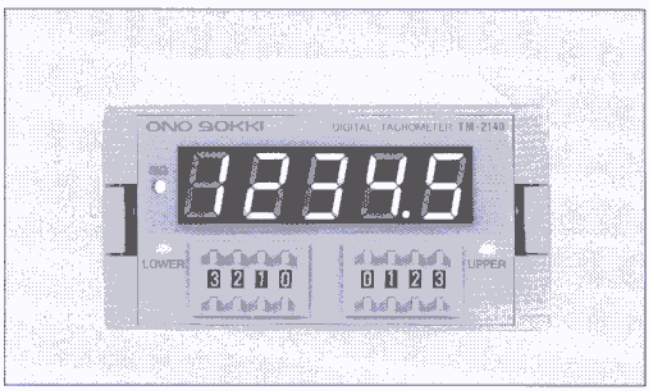
Frequency range:	20, 10, 5, 2, 1, 0.5, 0.2kHz
Linearity:	±0.3% of full scale
Output voltage:	0 to 10V in each frequency range (Load: 1kΩ min.)
Output current:	4 to 20mA in each frequency range (Load: 500Ω max.) * When voltage load is above 100kΩ, voltage and current can be output simultaneously.
Output adjustment:	Approx. ±5% of full scale (voltage) Approx. ±3% of full scale (current)
Zero setting accuracy:	±0.5% of full scale (voltage output, at room temperature) ±0.3% of full scale (current output, at room temperature)
Zero drift:	±0.01% of full scale/°C
Span drift:	±0.025% of full scale/°C
Response:	Changeable between 120ms ±20ms and 700ms ±100ms

Output Ripple

Values in parentheses are corresponding output voltage.

Frequency range (kHz)	Ripple (At an input frequency of 1% of the range)	
	Response 120ms	Response 700ms
20/10/5	0.3%/full scale (0.03V)	0.2%/full scale (0.02V)
2	0.5%/full scale (0.05V)	0.3%/full scale (0.03V)
1	1.5%/full scale (0.15V)	0.4%/full scale (0.04V)
0.5	3.0%/full scale (0.30V)	0.7%/full scale (0.07V)
0.2	6.5%/full scale (0.65V)	1.5%/full scale (0.15V)

TM-2140 with Comparator



- Both upper and lower limit data can be set.
- The setting value is compared with the most significant four digits on the display.
- High-speed judgement – 0.2 sec. of max. comparison period.

< Comparator Function Specifications >

Comparison error:	Set value ±one count
UPPER setter:	4-digit digital switches Compared with most significant 4 digits on display, and if UPPER setting is ≦ display value, then relay is turned ON.
LOWER setter:	4-digit digital switches Compared with most significant 4 digits on display, and if LOWER setting is ≧ display value, then relay is turned ON.
Output format:	Single transfer contact output (1 for UPPER or 1 for LOWER)
Max. contact capacity:	30VDC/1A, 250VAC/1A (resistive load) * When using at higher capacities than those listed above, take care to adjust for contact amplification and other factors.
Contact point longevity:	100,000 times min. (electrical)
Relay unit:	Changeable

	• High range: 1Hz to 20kHz * With no input signal for 2 sec. min., frequency (display) turns to zero.
Sudden deceleration follow-up function:	When the input signal drops suddenly and there's no input signal for more than 0.2 sec. during a 20kHz to 5Hz measurement, the display value will decrease automatically. (Note that this function works only in decelerating stages.)

Display Section

Display:	7-segment green LED (5 digits)
Character height:	14.2 mm
Display update:	Approx. every one second
SIG indicator:	Flashes synchronized with input signals
Error display:	Each digit displays flashing "1" for excessive frequency input. Each digit displays flashing "2" for display overflow. Each digit displays flashing "3" for setting errors.

Detector Power Supply

Output voltage:	12VDC (±0.6V)
Max. output current:	100mA
Ripple:	100mVp-p max.

General Specifications

Power requirements:	100 to 240VAC, 50/60Hz
Withstand voltage:	1500VAC for 1 min.
Insulation resistance:	5MΩ min.
Power consumption:	11VA max. (16VA max. for TM-2130)
Weight:	Approx. 630g
Operating temperature range:	0 to +40°C
Storage temperature range:	−10°C to +55°C
Outer dimensions:	96(W) × 48(H) × 140(D)mm

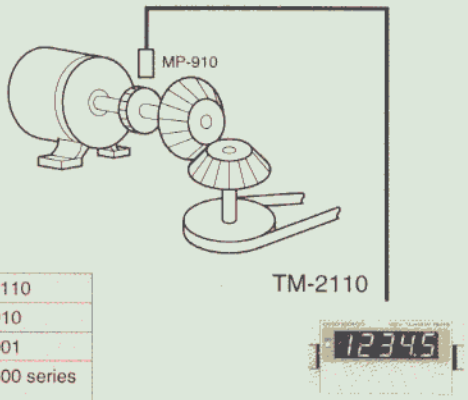
Accessories

Unit stickers:	1 r/min, min^{-1}, Hz, kHz, m/min. r/s, s^{-1}, km/h, mm/s, mℓ/min, ℓ/h
Panel mounting fixture:	1
Jumper wire:	1 (Between SIG-COM and GND)

* Power cable is sold separately.

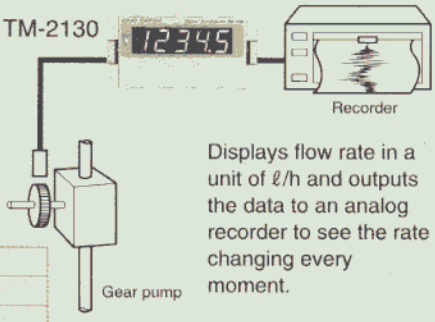
APPLICATIONS

Direct reading of rpm



Tachometer	TM-2110
Detector	MP-910
Detecting gear	MP-001
Cable between MP and TM	MX-500 series

Displays flow rate and outputs data to an analog recorder.

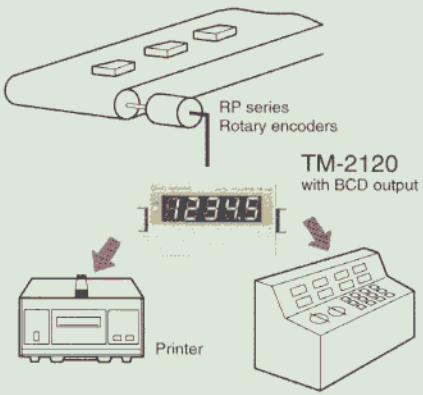


Displays flow rate in a unit of ℓ/h and outputs the data to an analog recorder to see the rate changing every moment.

Tachometer	TM-2130
Detector	MP-981
Detecting gear	MP-001
Cable between MP and TM	MX-700 series

BCD output for printers and other devices

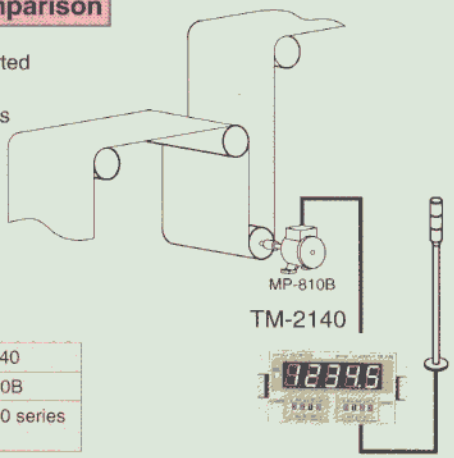
The TM-2120 measures belt conveyor speed, and the data is digitally transferred to a printer or a controller.



Tachometer	TM-2120
Detector	RP-432Z
Coupling	RP-001
Cable between RP and TM	RP-008

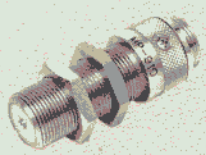
Line speed comparison

Line speed is converted from rpm of a roller. When speed exceeds the set value, a warning is issued.

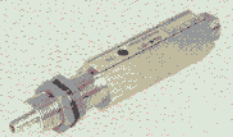


Tachometer	TM-2140
Detector	MP-810B
Cable between MP and TM	MX-500 series

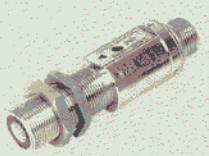
Main Rotation Detectors



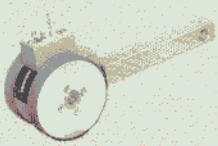
- **MP-910 Magnetic Rotation Detector**
  This is a typical rotation detector and is used in combination with a detection gear. There are many types such as oil-proof, heat-resistant, compact, and explosion-proof types, and they do not require a power supply and have excellent durability. The rotation range is from approximately 50 to 35000 rpm (at 60 P/R).



- **LG-916 Optical Detector**
  The LG-916 is a non-contact, once-per-rev tachometer sensor which generates an infrared light beam and detects each time the beam is reflected back from a marker mounted on a rotating shaft.



- **MP-981 Electromagnetic Rotation Detector**
  This is driven by 12 VDC and it can detect from the neighborhood of 0 rpm. Rpm from ultra-low speeds to high speeds are detected and the output is a constant amplitude squarewave. Models include acid-proof and immersion-proof types. The rpm range is from near to 0 to 20000 rpm (at 60 P/R).



- **MP-162 Electromagnetic Line Speed Detector**
  Line speed is detected by contacting rollers on the line which rotate the roller on the detector. It does not require a power supply, and the measurement range is 10 to 600 m/min.