



## Toner Density/Quantity Sensors

# TS series

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# Toner Density/Quantity Sensors

Product compatible with RoHS directive

## Overview of the TS series

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### ■ FEATURES

It is important for the toner (pigment powder) and carrier (magnetic powder) to always be mixed in the proper proportions so that PPCs and laser beam printers can stably attain clear images.


The TDK programmable toner sensor has been developed to constantly maintain the correct mix ratio between these two. The correct ratio can be maintained by using a DC output voltage that corresponds to the mix ratio.

- A voltage control adjustment function has been built in with a programmable toner sensor under the differential transformer principle using a high-performance ferrite core. Therefore, the operating point of the sensor can be changed over a wide range by applying a direct current to the control line.
- The sensor adjustment point can be installed at any location most convenient for operation because the control input line can be adjusted to an arbitrary length.
- Because it has such a wide control range, the operating point can be easily reset such as by changing the developer.
- Automatic adjustments are made possible by controlling the control voltage with the CPU.
- Fluctuations in operating points corresponding to each color can be easily corrected by changing the control voltage even with multi-color devices. Therefore, it is no longer necessary to have different sensors in operating points for each color as one sensor is enough to cover all colors.
- The sensor can be easily mounted to a wide range of locations.

### ■ APPLICATION

Toner density sensors for two-component developers used for color copiers or color laser printers, residual quantity sensors for magnetic one-component toners as well as proximity switches/counters for magnetic and conductive substances, microdisplacement measurement devices, etc.

○ RoHS Directive Compliant Product: See the following for more details. <https://product.tdk.com/info/en/environment/rohs/index.html>




 Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.  
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# Overview of the TS series

## PART NUMBER CONSTRUCTION

TS	05		24		A		N		K		□ □ □
Series name	Output voltage (V)		Driving voltage (V)max.		Analog output		Digital output		Type code [detection part diameter] (mm)		TDK internal code
	05	5	05	5	A	Yes	D	Yes	A	ø10	
	10	10	24	24	N	No	N	No	K	ø8	
									Z	ø6	

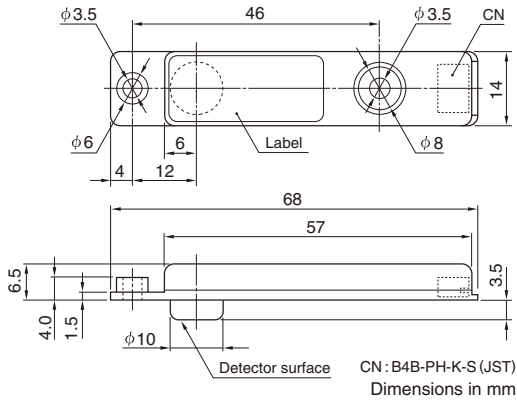
## PRODUCT LINEUP

Type	Part No.	Electrical characteristics			Size			
		Driving voltage (V)	Output voltage (V)max.	Output signal	Detection part (mm)	Body width (mm)	Body length (mm)	
 A	TS0505ANA-XXX	5.0	5.0	Analog	ø10	3.5	14.0	68.0
	TS0524ANA-XXX	24.0	5.0	Analog	ø10	3.5	14.0	68.0
	TS1024ANA-XXX	24.0	10.0	Analog	ø10	3.5	14.0	68.0
	TS0505ADA-XXX	5.0	5.0	Analog/Digital	ø10	3.5	14.0	68.0
	TS0524ADA-XXX	24.0	5.0	Analog/Digital	ø10	3.5	14.0	68.0
	TS1024ADA-XXX	24.0	10.0	Analog/Digital	ø10	3.5	14.0	68.0
 K	TS0505ANK-XXX	5.0	5.0	Analog	ø8	4.0	11.0	63.5
	TS0524ANK-XXX	24.0	5.0	Analog	ø8	4.0	11.0	63.5
	TS1024ANK-XXX	24.0	10.0	Analog	ø8	4.0	11.0	63.5
	TS0505ADK-XXX	5.0	5.0	Analog/Digital	ø8	4.0	11.0	63.5
	TS0524ADK-XXX	24.0	5.0	Analog/Digital	ø8	4.0	11.0	63.5
	TS1024ADK-XXX	24.0	10.0	Analog/Digital	ø8	4.0	11.0	63.5
 Z	TS0505ANZ-XXX	5.0	5.0	Analog	ø6	4.0	9.0	55.0
	TS0524ANZ-XXX	24.0	5.0	Analog	ø6	4.0	9.0	55.0
	TS1024ANZ-XXX	24.0	10.0	Analog	ø6	4.0	9.0	55.0

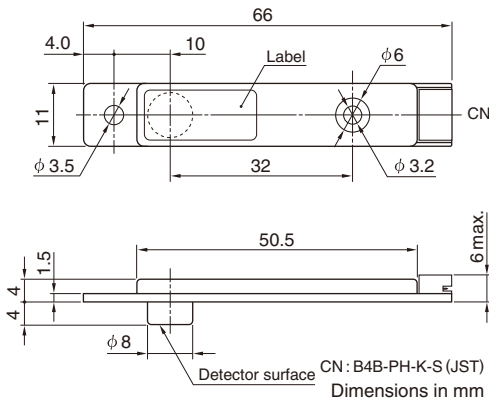
# TS series

## SHAPE & DIMENSIONS

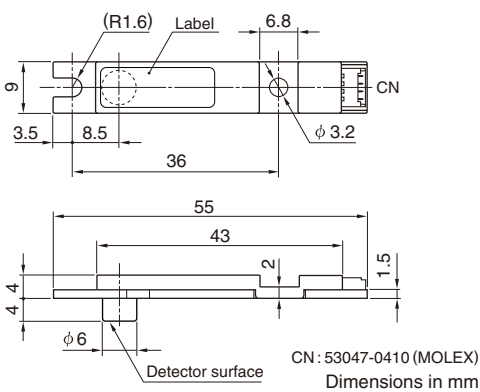
A type Detection part:  $\phi 10\text{mm}$



K type Detection part:  $\phi 8\text{mm}$



Z type Detection part:  $\phi 6\text{mm}$



⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.

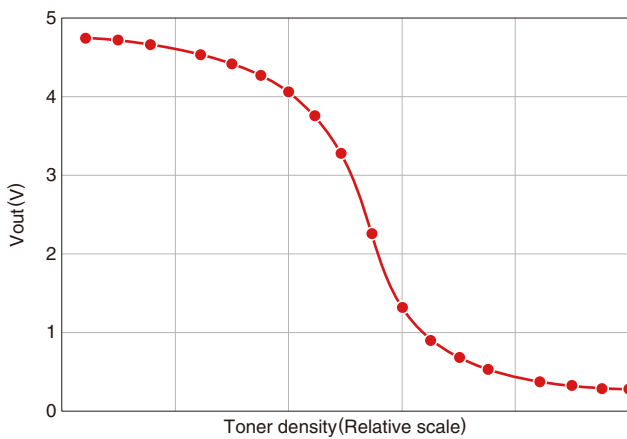
# TS series

## ELECTRICAL CHARACTERISTICS (TYPICAL CHARACTERISTICS)

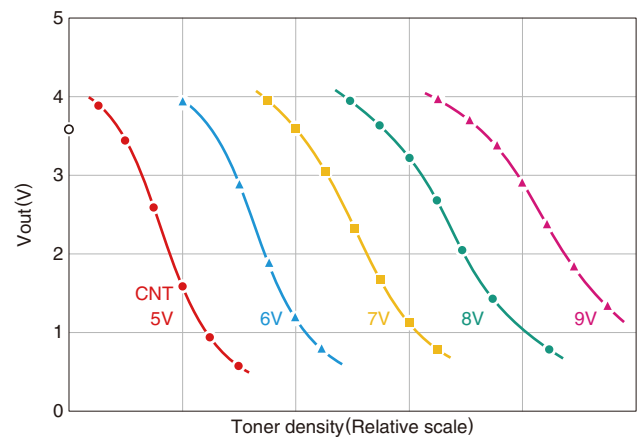
Power supply	
Rated input voltage (V)	24±5%
Power supply input current (mA)	20max.
Control input	
Rated control input voltage CNT (V)	7
Control input current (mA)	10max.
Control input voltage range (V)	2 to 24
Control input impedance (MΩ)	1±10%
Analog output characteristics	
Output voltage B (V)	2±0.2 [at normal temperature and humidity]
Output voltage A (V)	2.5±0.3 [at normal temperature and humidity]
Output variable range ΔB (V)	1min. [corresponding to changes of the control voltage 2V]
Output impedance (kΩ)	10±10% at DC
Output filter time constant (s)	0.1max.
Output ripple E <sub>p-p</sub> (mV)	20max.
Temperature change (V)	±0.5max. 0 to +50°C (change from 25°C)
Digital output characteristics	
Digital output voltage:H (V)	4.5min.
Digital output voltage:L (V)	0.5max.
Level comparator threshold voltage (V)	2.5±0.5 Analog Output voltage

## TYPICAL CHARACTERISTICS

TONER DENSITY VS. TYPICAL OUTPUT CHARACTERISTIC



CONTROL VOLTAGE VS. TYPICAL OUTPUT CHARACTERISTIC



# TS series

## ■ Handling Precautions

### For TS series products of all types

- Please request a delivery specification form containing more detailed information on characteristics and specifications so as to ensure correct and safe use of the products.

#### [Storage Environment]

- Check the standards concerning the storage conditions described in the delivery specifications of the products, and store them in accordance with the standards.

#### [Usage Environment/Operating Conditions]

- As for usage environment conditions and operating conditions of the products, check the standards concerning the usage environment conditions and operating conditions described in the delivery specifications, and use the products in accordance with the standards.

#### [Precautions in Use]

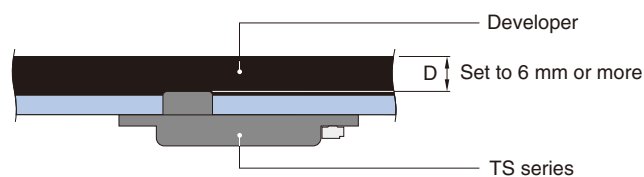
Adhere to the following recommendations to ensure stable operation of the TS Series products.

Values shown here are indications for general designs. Detection sensitivity is slightly influenced by the material and shape of the developer container that the product will be used with, and the mechanism for discharging the developer. Contact us if any special design specifications are necessary.

#### 1. The quantity of the developer (toner & carrier) around the sensing surface

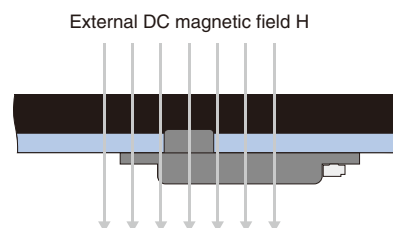
The sensitivity of the sensing surface drops below sensitivity level that has been set when the quantity of developer around the sensing surface (D in the diagram below) is low (5 mm or below). Therefore, set the minimum developer amount to 6 mm or more when designing the developer container and the mechanism for discharging the developer.

Increasing the sensitivity of the sensor itself through the circuiting can compensate for decreased detection sensitivity. However, this leads to decreased operational stability such as the deterioration of environment resistance and temperature resistance characteristics.



#### 2. Impact of an external magnetic field near the sensor

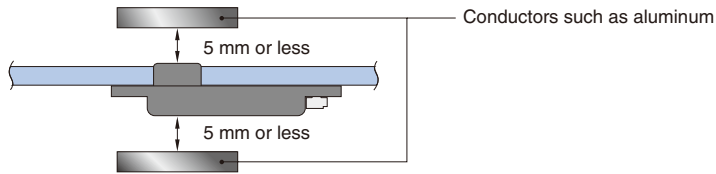
If the product is placed in an environment where a DC magnetic field is applied on the main body of the sensor (such as when there is a DC magnetic field source near the sensor), the operating point set in advance in accordance with the intensity of the DC magnetic field will change.



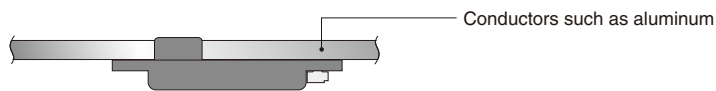
If the intensity of the DC magnetic field differs by individual device, the operating point of the sensor will need to be reset in accordance with each intensity of the DC magnetic field. As a general rule, an environment where there are no effects of a DC magnetic field is required. Please contact us if this is difficult due to design restrictions.

### 3. Impact of conductive materials near the sensor

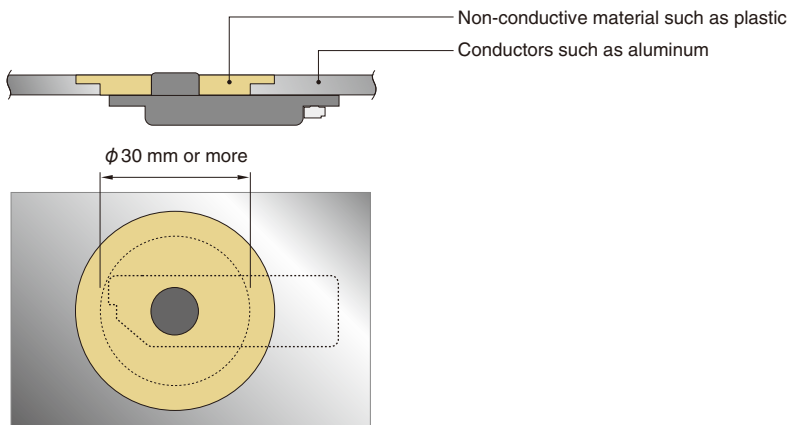
A conductive material placed near the product can also change the operating point that has been set ahead of time. If a certain distance is kept between them, normal operation can be recovered by resetting the operating point. However, the adjustment range for the operating point may be exceeded if the conductive material is extremely close to the product, as in the diagram below.



If the sensor is installed directly on a conductor such as aluminum, as in the diagram below, it may not function at all since the driving power of the sensor coil will be shorted with the aluminum plate.



When installing the main body of the sensor on a conductor such as an aluminum plate, please do so after hollowing out the area around the projection of the detection part by at least  $\phi 30$ mm and loading an object such as a plastic plate, as shown in the diagram below. However, there may be fluctuations in the operating point that has been set beforehand even after such a countermeasure has been implemented if there are large variations on how the mounting is done.



### Other Requests/Notices

- We do not assume any responsibility for any damage caused by the use of our products exceeding the scope or conditions defined in the delivery specifications.
- Specifications of the products in this catalog are subject to change without notice due to improvements or other reasons. In addition, supply of the products may be cancelled without notice.