

2021 News

OMRON Solutions for Building Control



Omron Electronic Components Europe BV

Energy performance of buildings

The new Directive 2010/31/EU strenght the EPBD, introducing new requirements for the use and measurement of energy in a building, especially the nearly zero emission buildings:

Article 9: Member states shall ensure that:

- a) **By 31st December 2020, all new buildings are nearly zero-energy buildings; and**
- b) **After 31st December 2018, new building occupied and owned by public authorities are nearly zero-energy buildings.**



Energy performance of buildings

Lighting has a central part in the commitment of reducing the energy consumption in a building.

All advanced domotic systems, to be able to comply to the new EU regulations, will mandatory have to use an automated lighting system to save power.

Energy reduction examples using an automatic light system in a building:

Save 50/70% on conference rooms and open-plan offices;

Save 40/60% on corridors;

Save 40/60% in warehouse racking aisles;

Solution for Building Management – Commercial building

Fans Control

Air velocity sensors

D6F-W

D6F-V



Heat Recovery Units & clogged filter detection

Heat Recovery Unit

Air flow measurement
D6F-PH

Clogged filter detection
D6F-PH



Visualization of indoor environment

Temperature/humidity,
light, UV, absolute
pressure measurement
Environment sensor 2JCIE



Temperature control

Ambient Temp. control
IR thermal sensor D6T



Proper light & environment

Human presence detection

Human image sensor B5T series
OKAO® Vision



Human presence detection (visualization of occupancy)

Thermal sensor D6T series



Emergency Light switching

E/M relays for light control

2 poles PCB power relay G22RL

2 poles PCB signal relay G6S



Light switching control

E/M relays for light control

High inrush PCB power relay
G5RL, G5Q-E



D6T - Thermal sensors for human detection.



D6T-32x32 advantages against different detection methods algorithm

New algorithm for people detection top view D6T 32x32

- Possible to detect **human count & position** and **object temperature**.
- This multiple output contribute smarter detection & control.

		①Pyro electric	②RGB camera	③Thermal IR
Human detection	Existing	✓ <small>*Can't detect stationary person</small>	✓✓	✓✓
	Count	-	✓	✓
	Position	-	✓	✓
Temperature detection	Room temperature (HVAC control)	-	-	✓
	Abnormal temperature (Safety)	-	-	✓

Omron IR sensor product portfolio

New algorithm for people detection top view



Chart : Omron thermal IR sensor product portfolio

	D6T-1A-01	D6T-1A-02	D6T-8L-09	D6T-8L-09H	D6T-44L-06	New D6T-44L-06	D6T-44L-06H	D6T-32L-01A
Pixel number	1x1	1x1	1x8 (8pxcel)	1x8 (8pixel)	4x4 (16pixel)	4x4 (16pixel)	4x4 (16pixel)	32x32 (1024pixel)
Appearance & Pixel image (*1)								
FOV (Field of view)	X : 58° Y : 58°	X : 26.5° Y : 26.5°	X : 54.5° Y : 5.5°	X : 54.5° Y : 5.5°	X : 44.2° Y : 45.7°	X : 44.2° Y : 45.7°	X : 44.2° Y : 45.7°	X : 90° Y : 90°
Object temp	5 to 50°C	-40 to 80°C	5 to 50°C	5 to 200°C	5 to 50°C	5 to 200°C	5 to 200°C	0 to 200°C
Operating temp	0 to 60°C	-40 to 80°C	0 to 60°C	0 to 60°C	0 to 50°C	0 to 50°C	0 to 50°C	-10 to 70°C
Temp resolution (NETD)	0.02°C	0.06°C	0.03°C	0.03°C	0.06°C	0.09°C (Tentative)	0.06°C	0.33°C
Object temp accuracy	±1.5°C max (*2)							±3°C max (*3)
Consumption	3.5mA typ		5mA typ					19mA typ
Comm interface	I2C							
Supply voltage	4.5 to 5.5VDC							

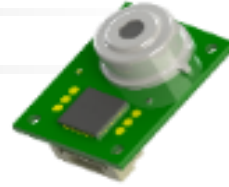
*1 : Actual output of D6T sensor is only temperature figure (not thermal image).

*2 : Measurement condition (1) Tx=25°C, Ta=25°C (2) Tx=45°C, Ta=25°C (3) Tx=45°C, Ta=45°C. Detail conditions are listed in data sheet.

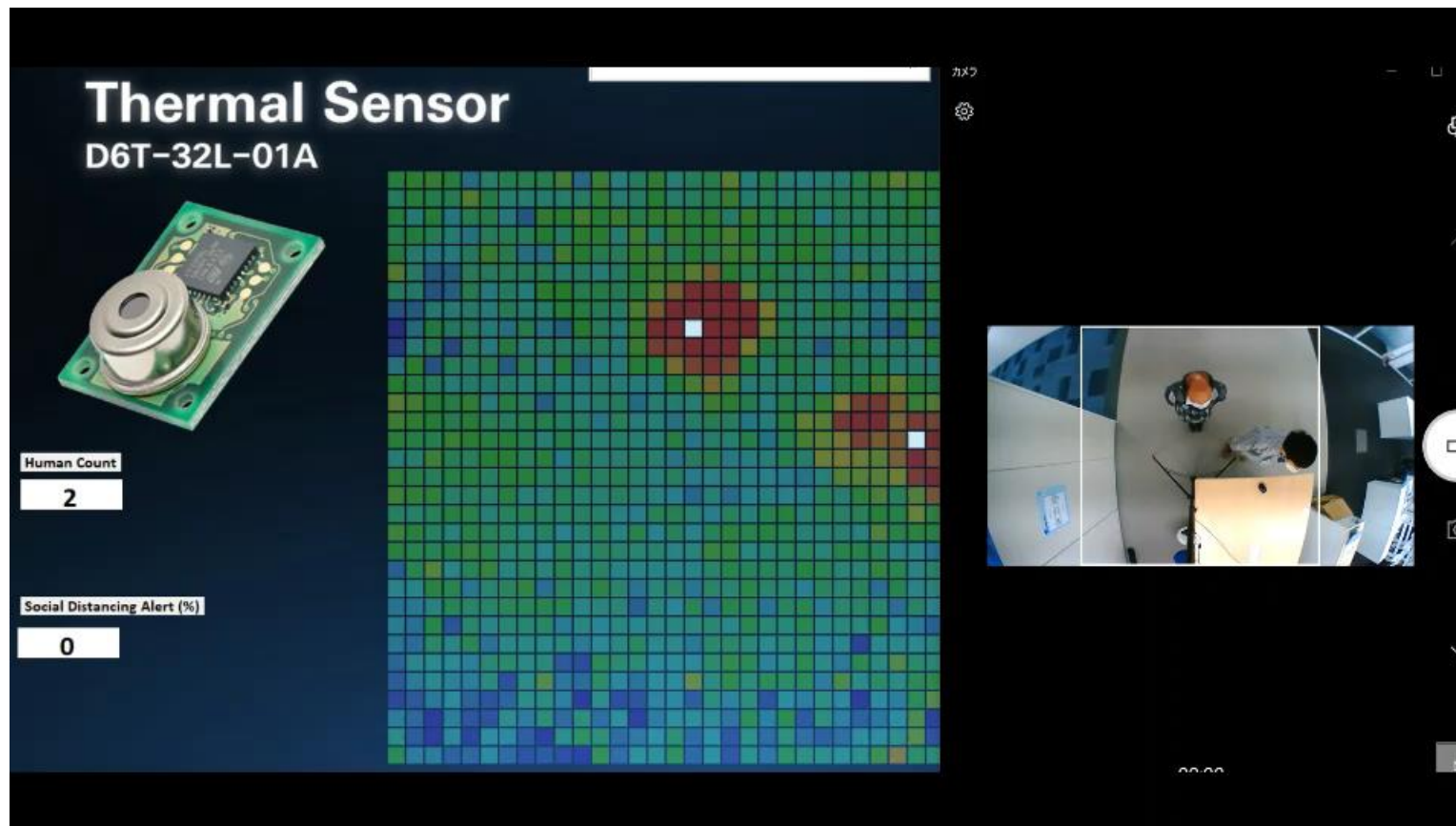
*3 : Measurement condition Tx=25°C, Ta=25°C central 16 pixel area

New D6T-32x32 with algorithm – TOP view

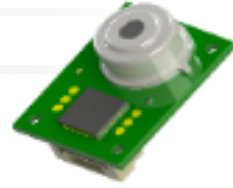
- We're going to complete D6T-32x32 with human detection algorithm development.
- Output both **temperature** & **human** information by one small package.



Demonstration

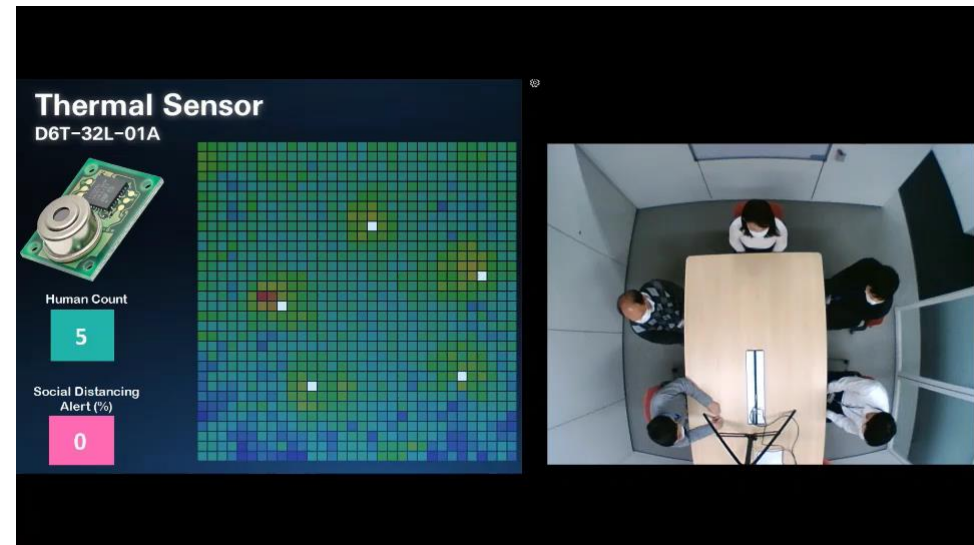
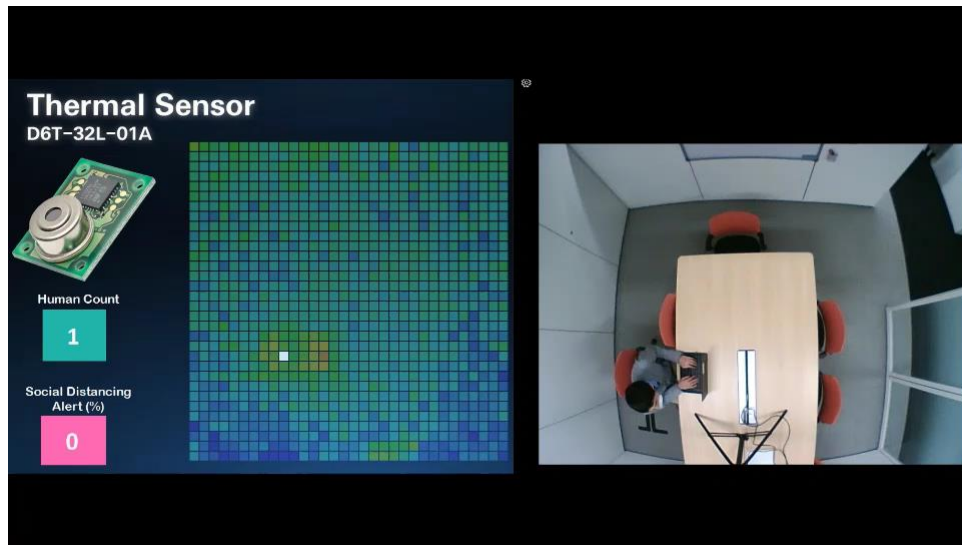


New D6T-32x32 with algorithm – TOP view



- We're going to complete D6T-32x32 with human detection algorithm development.
- Output both **temperature** & **human** information by one small package.

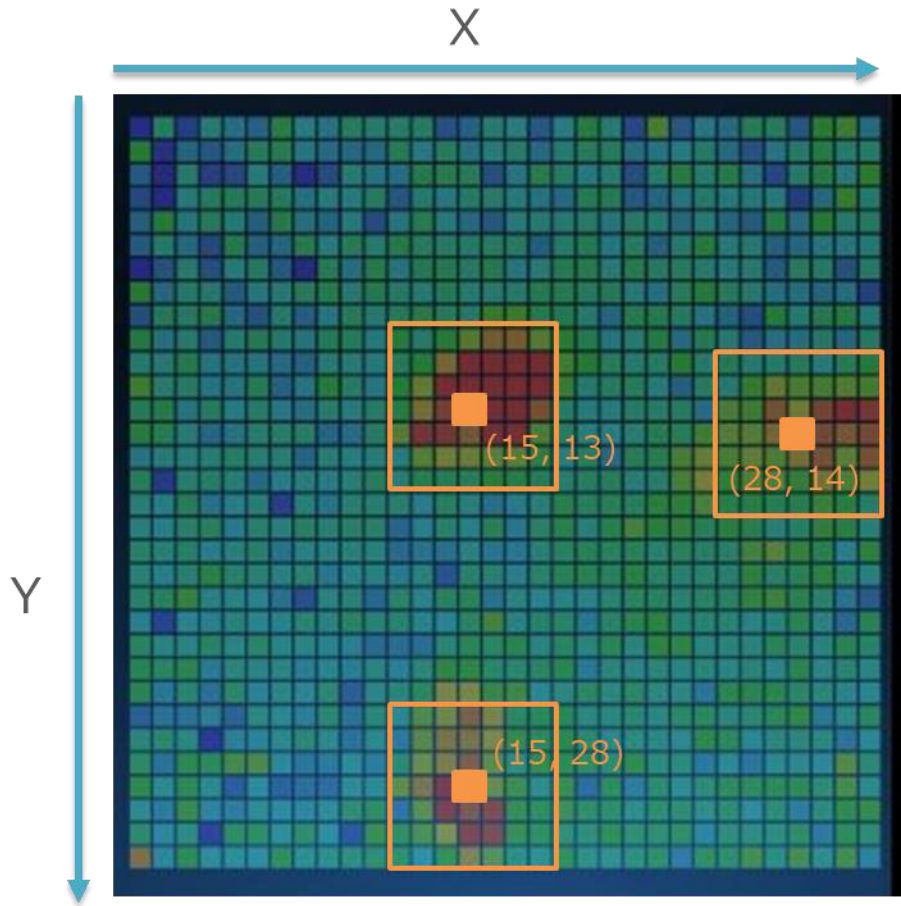
Office situations



Example of output

Human Number : 3

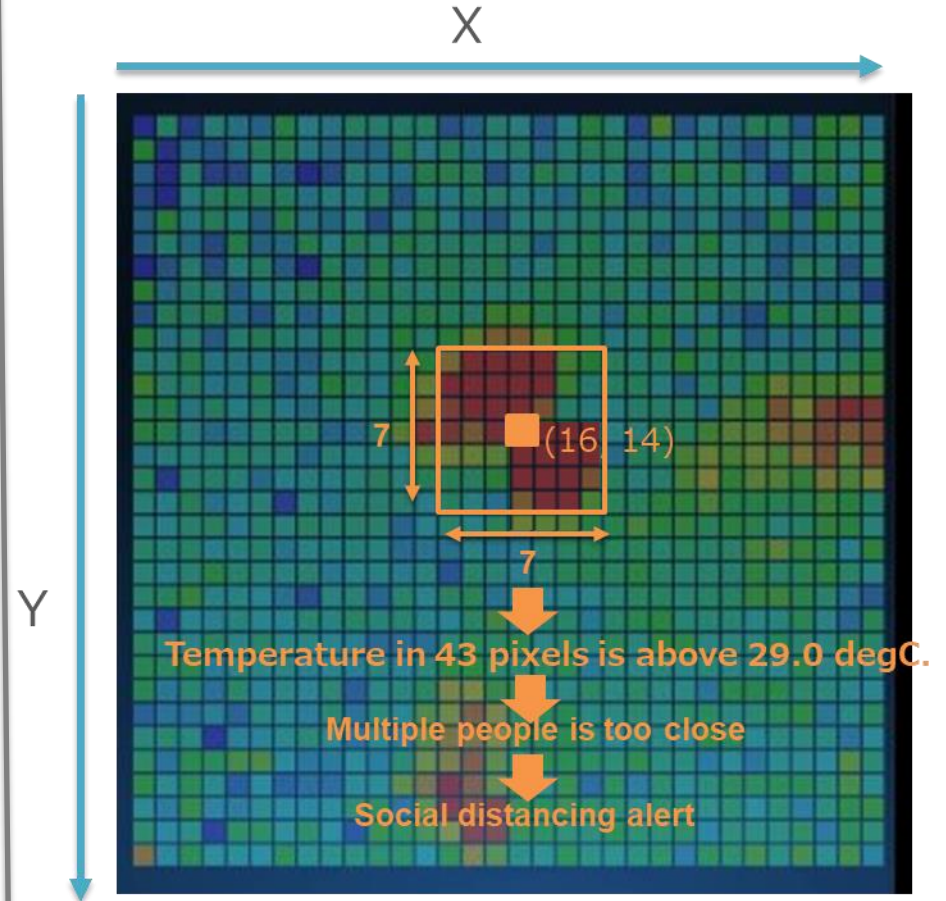
Human Position: (15, 13), (28, 14), (15, 28)



Social distancing Alert area position: (16, 14)

Social distancing Alert area degree: 87 %

(= 43 pixel / 49 pixel)



Solutions for Lighting Control – Fluorescent Lamps

1. UL TV

TV-5 (78A inrush / 5A break : 25kops)

TV-8 (117A inrush / 8A break : 25kops)

* TV test is used a tungsten lamp

2. Light bulb test

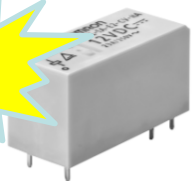
2400W light bulb: 40kops by G5RL-HR

Use of –ASI contact, AgInSn, best alloy for lamp load.

Relays for domotic and lighting solutions:

G5RL-EL -U/K

New !



16A Latching relay

IEC-60669-2-1

G5RL-TV8



Up to 100A

UL-TV8

G5RL-LN



“Silent” operation

UL-TV8

G5RL-U/K



Latching relay

UL-TV8

G5Q-EL2

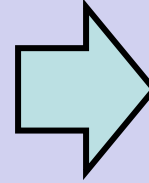


10A compact relay

Applications

G5RL-EL support high inrush application

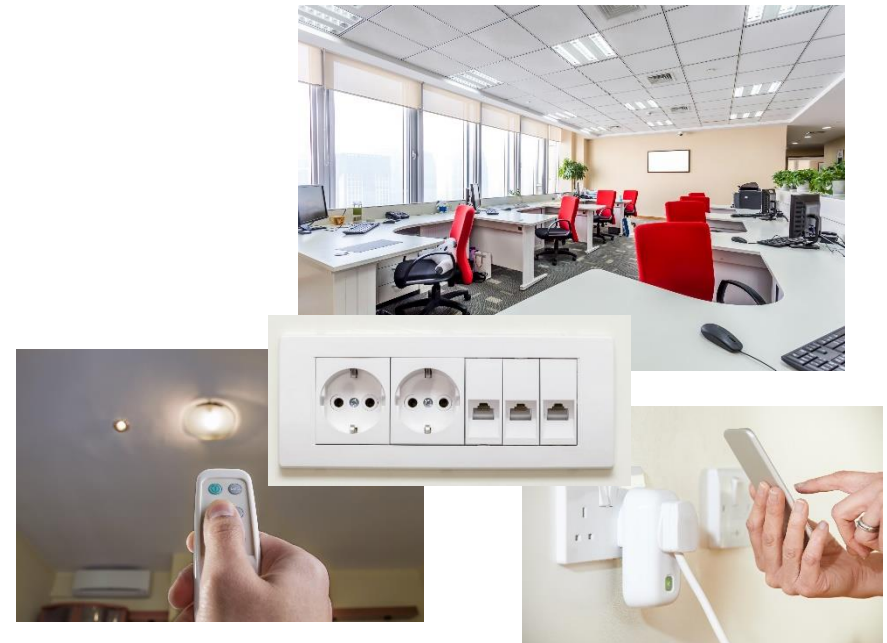
Application trend and needs
Increased lighting load control



G5RL-EL Value
Satisfy high inrush needs

- Lighting Controller
- FA and BA equipment

- Office buildings lighting systems lighting ON/OFF with capacitive load



G5RL- EL: Result of VDE approvals

Passed VDE test IEC 60669-1

16A 140microF

The condition is 20Kcycle(40Kops)



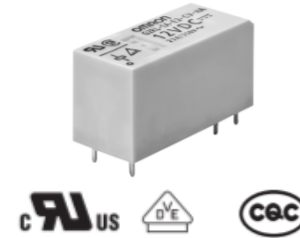
Elektromechanisches Elementarrelais
Electromechanical elementary relay

DIN EN 60669-1 (VDE 0632-1):2009-10; EN 60669-1:1999+A1:2002+A2:2008; IEC 60669-1:1998+A1:2002+A2:2008
Abschnitt / Clause 17; 18.1; 18.2; 19.2
DIN EN 60669-2-1 (VDE 0632-2-1):2010-03; EN 60669-2-1:2004+ A1:2009; IEC 60669-2-1:2002+A1:2008
Abschnitt / Clause 19.102

Position Position	Typ(en) Type(s)	Bemessungsspannung der Kontakte / [V] Rated voltage of contacts / [V]	Bemessungsstrom der Kontakte / [A] Rated current of the contacts / [A]	Kontaktart Kind of contacts Schließer → normally open (NO) Öffner → normally closed (NC) Wechsler → change over (CO)	Abschnitt: Clause	Test: Test	Prüfspannung: Test voltage	Prüfstrom: Test current	Schaltspiele Cycles	Umgebungstemperatur / °C Ambient temperature / °C
15	G5RL-K1A-EL-HA	AC 250	16	NO (NC) ¹⁾	18.1	Schaltvermögen / Making and breaking capacity	U = 275 V	I = 20 A cos φ 0,3	100	Raumtemperatur / Room temperature
					18.2	Schaltvermögen / Making and breaking capacity	U = 230 V	I = 20 A (4600 W = 23 Glühlampen / Tungsten filament lamps a 200 W)	100	
					19.102 (19.2 ²⁾)	Bestimmungsgemäßer Betrieb / Normal operation	U = 250 V	I = 16 A Last A / Load A (C = 140 µF) Last B / Load B	20 000 50	

G5RL-EL Main Specifications

- ◆ **Inrush current**
IEC standard for lighting
Conform to IEC60669-2-1 Load A
- ◆ **Conform to IEC60335-1**
Conform to glow wire standard



New

Apr. 2021
Launch

	Standard G5RL-U/K1A	New model G5RL-U/K1A-EL-HA
Size	W12.7mm×L29.0mm×H15.7mm	
Enclosure	Flux protection	Flux protection
Contact form	SPST(1a)	
Coil power consumption	U: 600mW, K: 750mW(DC5, DC12), 840mW(DC24)	
Rated load (Resistive)	AC250V 16A DC24V 16A	AC250V 16A
Dielectric strength (Coil and contacts)	4,000VAC, 50/60Hz for 1 min	
Dielectric strength (contacts of same polarity)	1,000VAC, 50/60 Hz for 1 min	
Electrical durability	Resistive : 50Kops	Resistive : 20Kops
Ambient temperature	-40°C to 85°C	
Safety standard (Inrush)	TV5, TV8 Standard Ballast: 8A 250VAC 2000W 250VAC(Tungsten)	IEC60669-2-1 LoadA: 16A,250VAC, 140uF, 23°C, 20Kcycle.
Safety standard	-	IEC60335-1 (GW)

G5RL High Inrush lineup

Inrush current

255A
IEC60669-1

117A
TV-8

78A
TV-5

G5RL-EL

G5RL-TV8

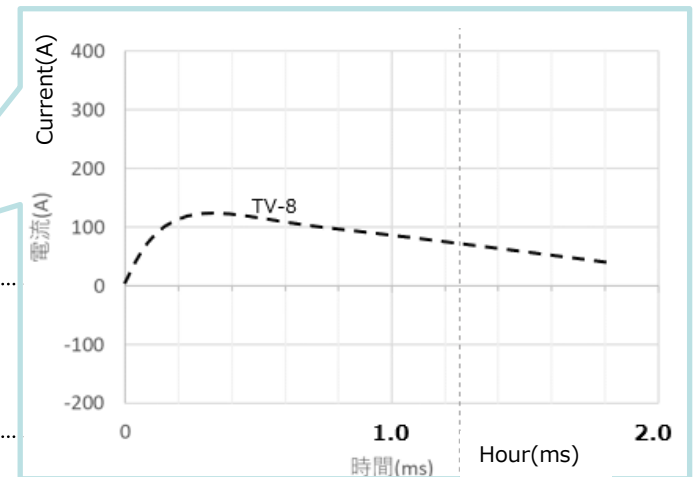
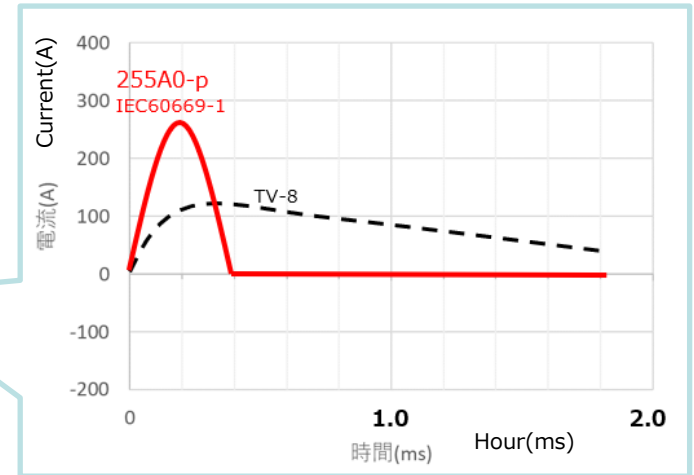
G5RL

3A

10A

16A

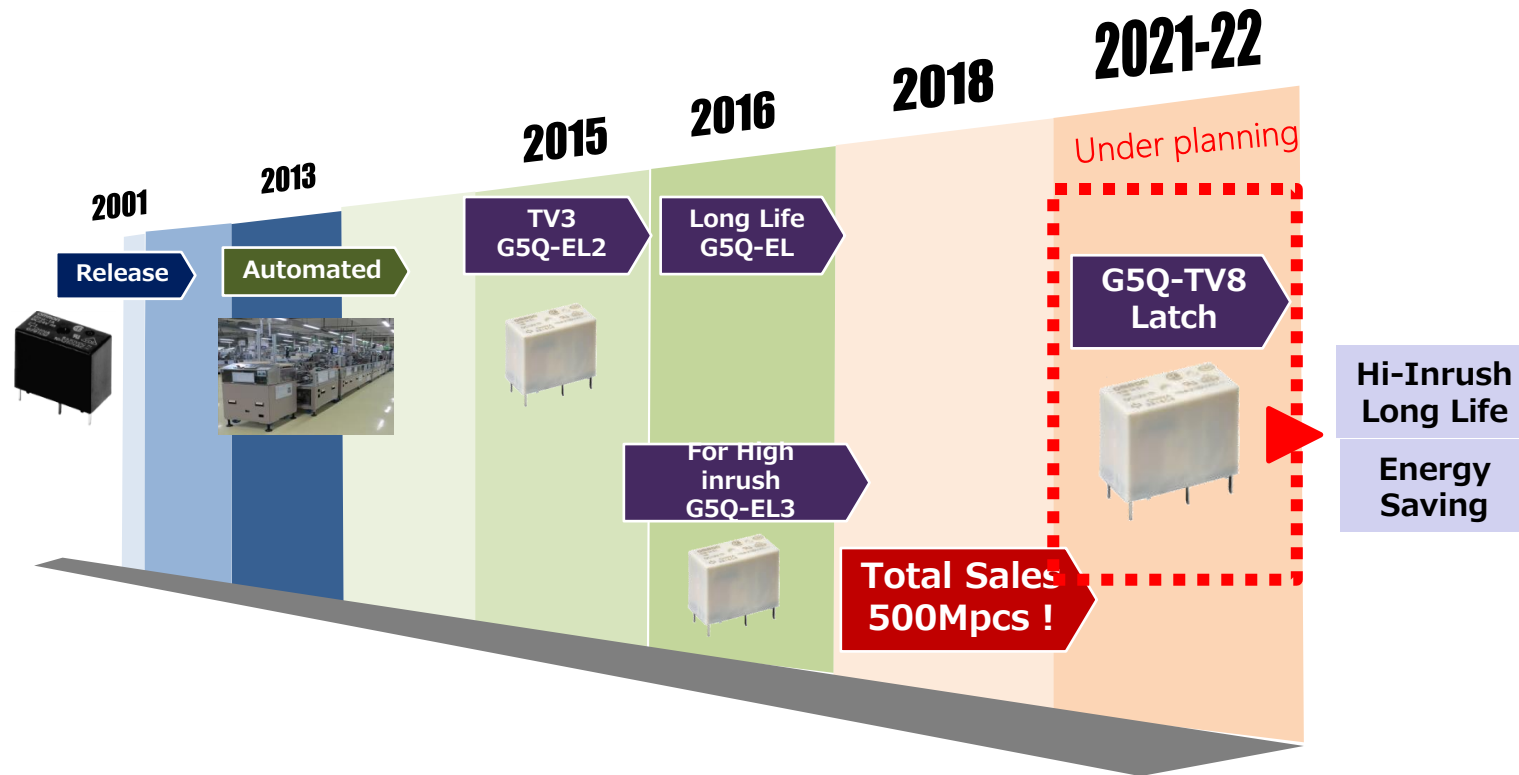
Breaking current



Confidential C

G5Q : Updated Product Roadmap

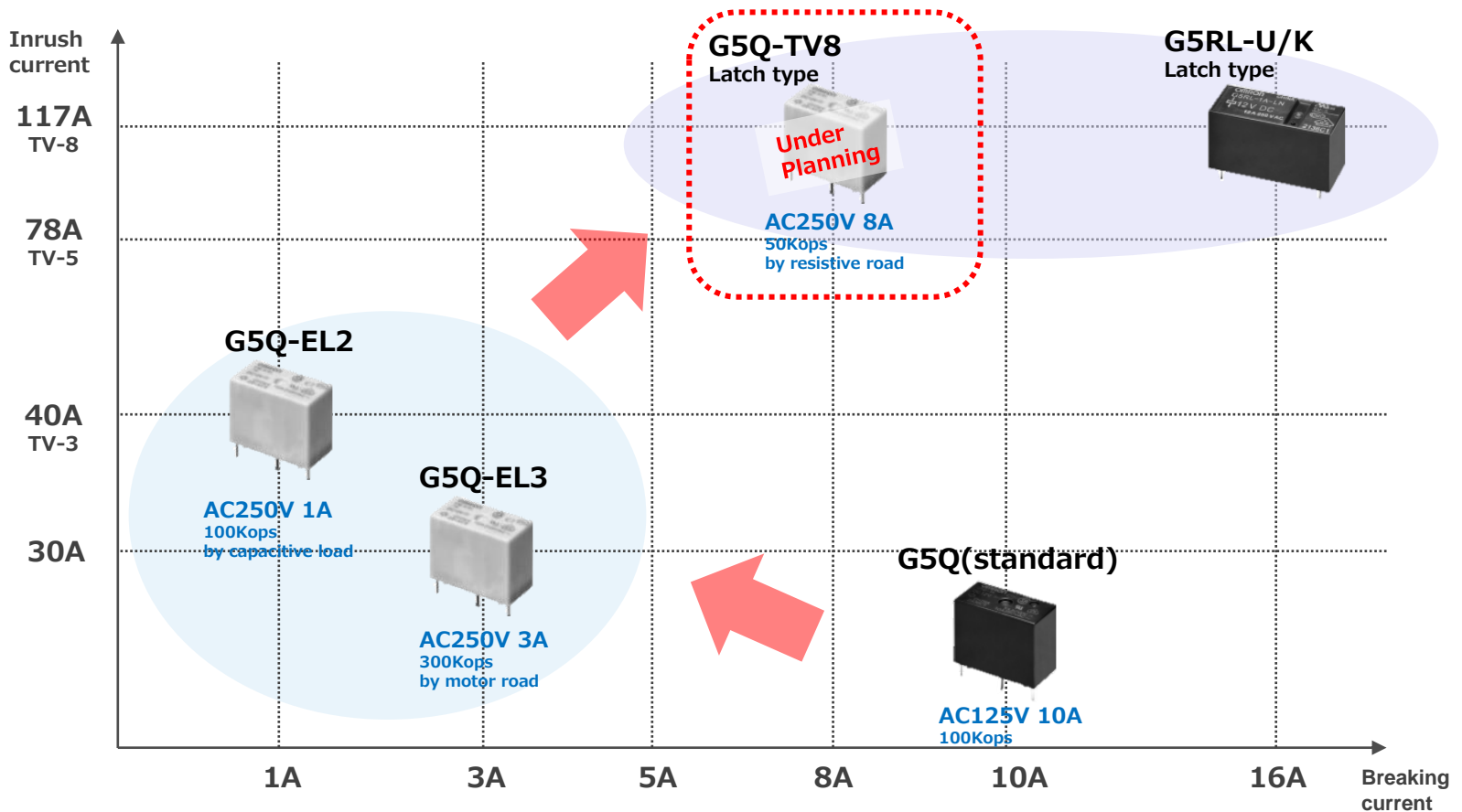
Additional lineup for Hi-inrush resistance of G5Q in order to correspond to the trends in energy saving and miniaturization.



Confidential C



G5Q : Product lineup expansion

Continue to the G5Q-EL type, we'll add TV8(Hi-inrush) type with latch function and capture lighting market's demand increase because of saving energy.



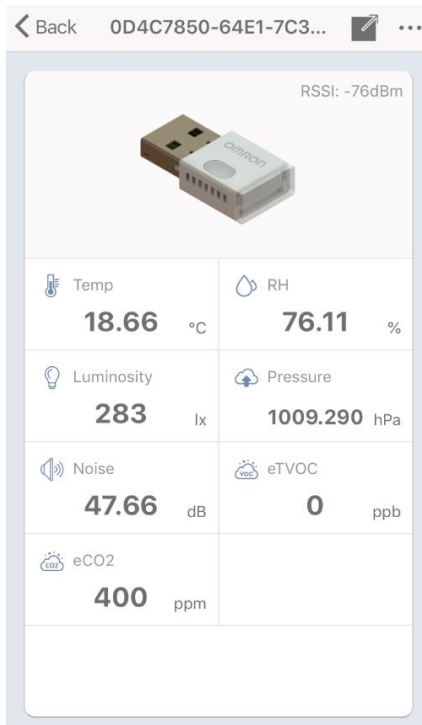
Bag type vs. USB type

Package, power supply, sensor function, communication

Appearance			
Item		2JCIE-BL01	2JCIE-BU01
Size		39.0 x 46.0 x 14.6 mm	14.9 x 29.1 x 7.0 mm
Power		CR2032	USB supply
Material of housing		ABS, PC	ABS, PC, SPCC
sensor		Temp., humidity, light, UV , pressure, sound	Temp., humidity, light, pressure, accelerator , sound, VOC
range	Temp.	-10~60°C	-10~60°C
	Humidity	30~85%RH	30~85%RH
	Light	10~2000lx	10~2000lx
	UV	Index1~11	-
	Press.	700~1100hPa	700~1100hPa
	Sound	37~89dB	40~94dB
	Accelerator	-	Earthquake / vibration detect judge
VOC	-	0~32767ppb	
Usage environment		Indoor and outdoor	Indoor
communication		Bluetooth4.1	Bluetooth5.0, USB2.0

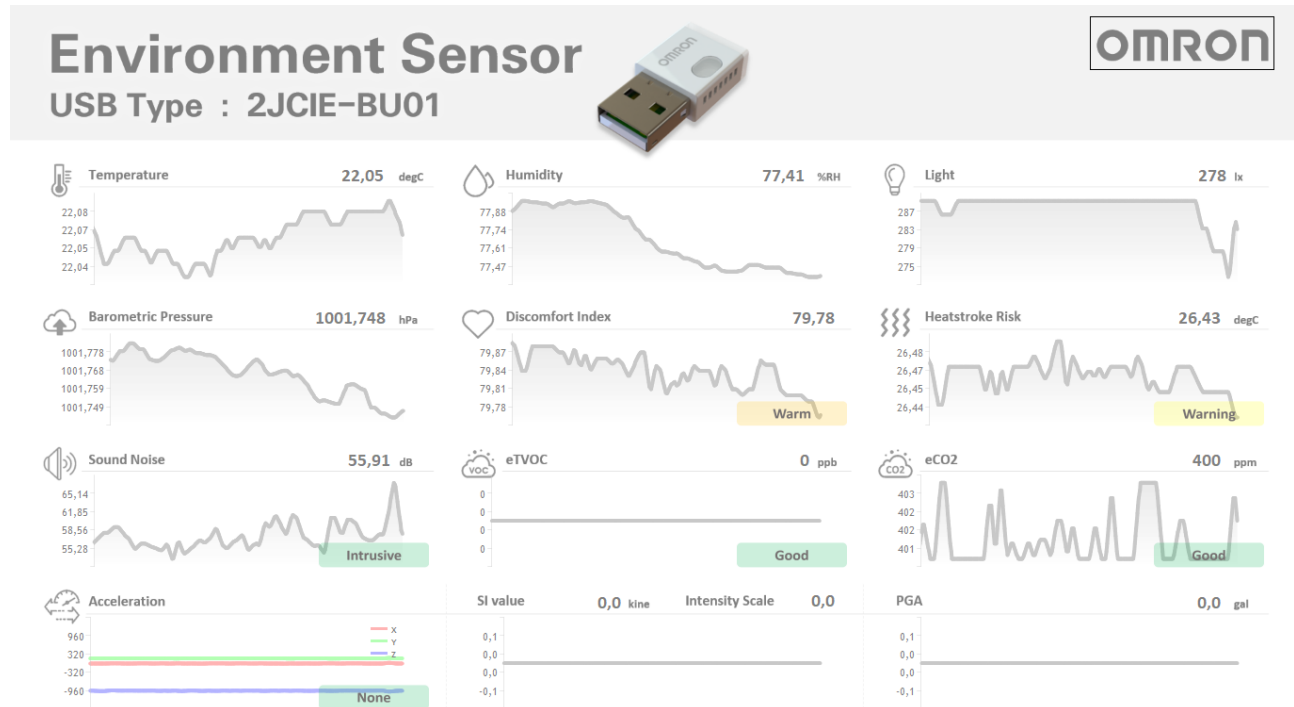
Smartphone & PC Application

Smartphone screenshot



- Sensor data
- Alert status
- Notice record
- Historical data on graph on the screen

PC screenshot



VOC Guidelines & Detection

The sensor allows eTVOC*2 reading which refers to the total concentration of volatile organic Compounds to help users realize the importance of maintaining a comfortable environment.

*1 VOCs (Volatile Organic Compounds) include such as alcohol consumption, cigarette smoking, and formaldehyde.

*2 eTVOC (equivalent Total Volatile Organic Compounds) refers to the total concentration of volatile organic compounds in a room environment.



INDICATORS (depending on single Country)

Level	Hygienic Rating	Recommendation	Exposure Limit	TVOC [ppb]
5 Unhealthy	Situation not acceptable	Use only if unavoidable / Intense ventilation necessary	hours	2200 – 5500
4 Poor	Major objections	Intensified ventilation / airing necessary Search for sources	< 1 month	660 – 2200
3 Moderate	Some objections	Intensified ventilation / airing recommended Search for sources	< 12 months	220 – 660
2 Good	No relevant objections	Ventilation / airing recommended	no limit	65 – 220
1 Excellent	No objections	Target value	no limit	0 – 65

Table 2 TVOC guidelines issued by the German Federal Environmental Agency*

LEVEL display (POOR, MODERATE, GOOD)

Level	Category	TVOC [ppb]	eCO2[ppm]
1	GOOD	<250	400-1499
2	MODERATE	250-449	1500-2499
3	POOR	>450	>2500

Note: VOC sensor does not identify gas types. Only outputs the total concentration of VOCs.

Note: When VOC is over 250ppb, the influence will occur on our body.

Technical Advantages – Measurement Principle

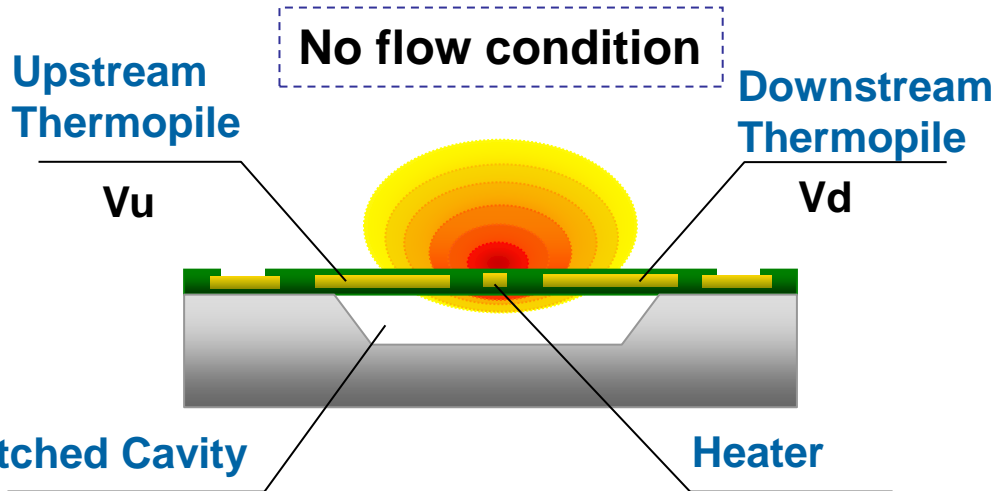
D6F MEMS Flow Sensor Chip

Patent protect

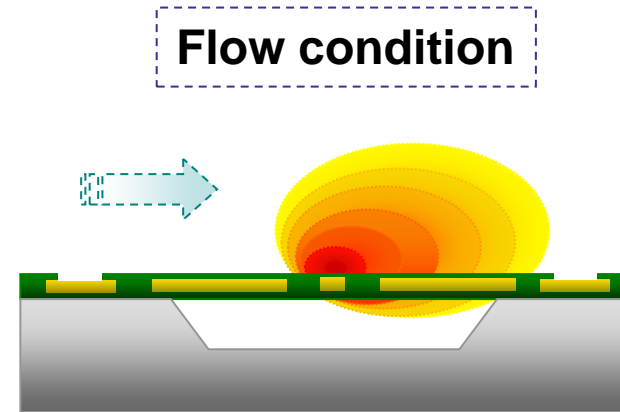
All products

Measurement principle

Temperature difference between two thermopiles is proportional to the mass flow across the sensor chip.



$V_d = V_u$
(Temp. distribution is Symmetrical)



$V_d \neq V_u$ ($V_d > V_u$)
(Heat symmetry collapses)

Equation of sensor output voltage

$$V_{out} = V_{off} + (V_d - V_u) \times \text{gain}$$

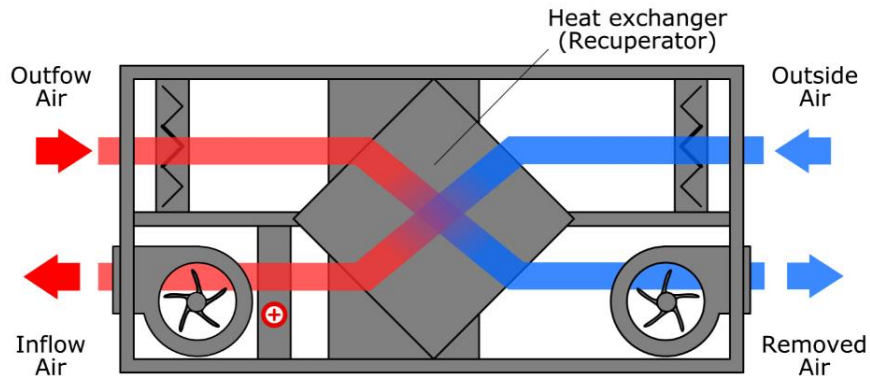
V_{out} : Output voltage, V_{off} : Offset voltage, V_d and V_u : Thermopile's electromotive force

Applications – usage in heat recovery units HRU

D6F-PH digital pressure sensors for air flow and clogged filter detection in heat recovery units.



D6F-PH pressure sensors used for air flow measurement



D6F-PH pressure sensors used for clogged filter detection

Product Line up – D6F-PH Digital Sensor

Features

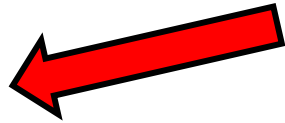
- Differential pressure measurement with **high accuracy and repeatability**
- **Stable measurement over wide temperature range** with temperature compensation
- Digital output using ASIC algorithm
- Bi-directional sensing
- High flow impedance to reduce the influence of bypass configuration
- **Small size** resulted from flow path design



Specifications

Pressure range	+/-50Pa	D6F-PH0505AD3
	0-250Pa	D6F-PH0025AD1
	+/-500Pa	D6F-PH5050AD3
Temperature range	-20°C to 80°C	
Accuracy	+/- 3% R.D.	
Output signal	I2C communication	
Power supply	3.3 +/- 0.3V DC	
Resolution	12 bit preset	
Repeatability	0.5% R.D.	

Applications – flow control in fans



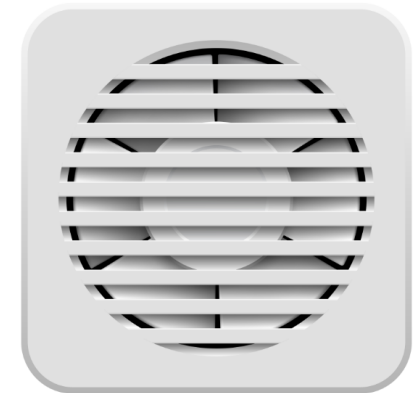
D6F-V



D6F-V can improve efficiency by monitoring the exact air rate which is extracted by the fans.

Application

Air velocity control in fans to improve AIR QUALITY.



Example of Building Regulations for AIR QUALITY:

Document (F1) Means of Ventilation in UK stipulates the provision of adequate mechanical ventilation rates in non-habitable rooms, such as Toilets, Bathrooms/Shower rooms, Kitchens and Utility rooms in domestic dwellings.

ROOMS CONTAINING EXTRACT VENTILATION OPENING WINDOWS RATES

Toilet /Sanitary accommodation – 6 l/sec (22m³/hr)

Bathroom/Shower Room – 15 l/sec (54 m³/hr)

Kitchen with cooker hood – 30 l/sec (108 m³/hr)

Kitchen without cooker hood – 60 l/sec (216 m³/hr)

Utility Room – 30 l/sec (108 m³/hr)

Product Line up – air velocity sensors

D6F-W

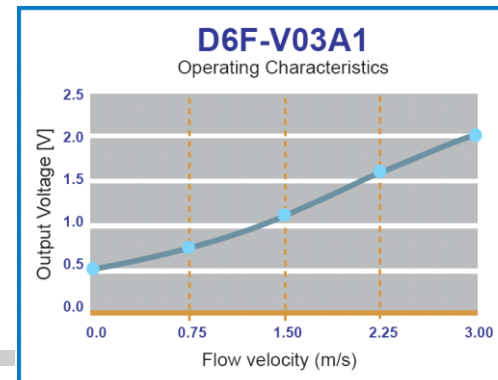
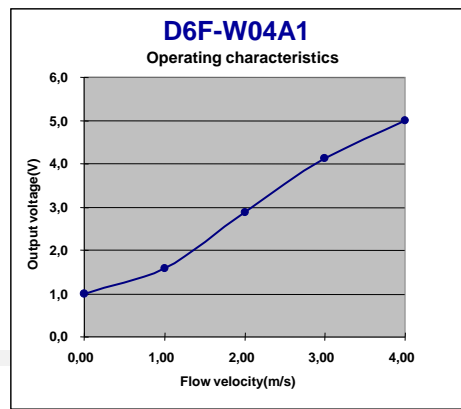


D6F-V



- Three flow velocity versions available: 1 m/s, 4 m/s and 10 m/s;
- **Analog output;**
- Special flow path structure to enable dust segregation (DSS);
- Keep high accuracy in extremely low flow velocity conditions;
- Temperature compensated;
- Supply voltage from 10.8VDC to 26.4VDC.

- Available with flow velocity 3 m/s;
- **Analog output;**
- High flexibility for installation with smallest package (approx. half size of D6F-W);
- Special flow path structure to enable dust segregation (DSS);
- Supply voltage from 3.15VDC to 3.45VDC.



Technical Advantages – Dust Segregation

DSS (Dust Segregation System)

D6F-W, D6F-V

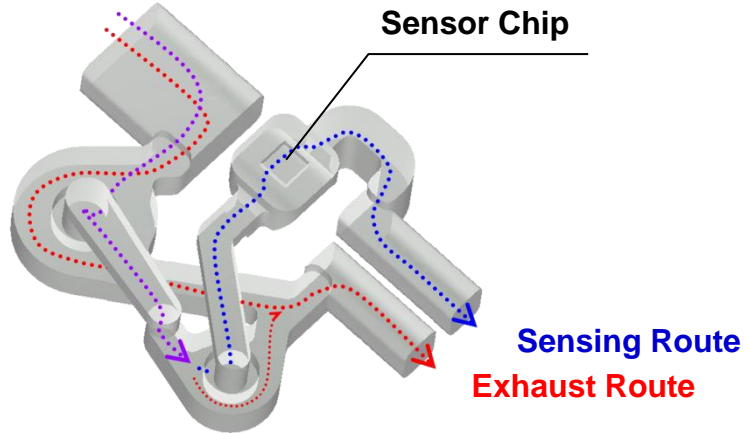


Fig. Inside structure of D6F-W

Based on centrifugal principle, the specially designed housing segregate particle from contaminated air.

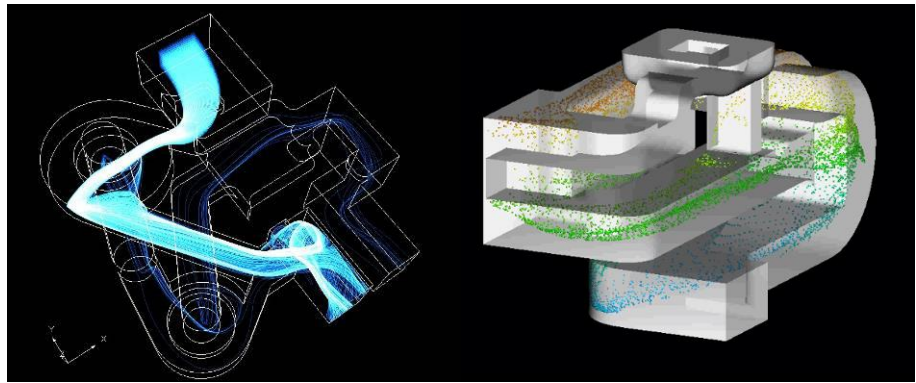


Most particles cannot pass through the sensing area, and are discharged through the exhaust route.

Result of numerical analysis

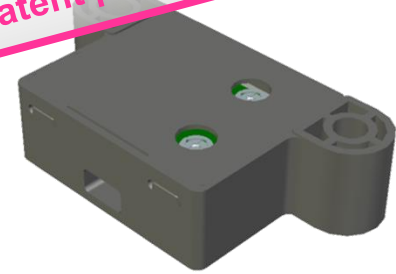
D6F-W

D6F-V



As a result of the numerical analysis, the inflow probability of particles (<2um) into the sensing area was able to be decreased to 1/200 than conventional structure.

Patent protect



Patent protect





Thank you for your attention

**Omron Electronic Components BV
European Headquarter
Wegalaan 57
2132 JD Hoofddorp
Netherlands
Tel. +31 23 568 1200
Fax. +31 23 568 1212
Info-components@eu.omron.com
www.omroncomponents.com**