

# HOW TOUCHLESS SWITCHES KEEP DESIGNS CLEANER



**IDEC**

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# HOW TOUCHLESS SWITCHES KEEP DESIGNS CLEANER

The COVID-19 pandemic made the whole of humanity suddenly aware of how much we all touch things at work and in public settings. It also made many more cognizant of how viral and bacterial illnesses are often transmitted through touch surfaces. So even as governmental and societal expectations for masking, hand sanitizing, and distancing become more relaxed, demand for touchless functions on designs of all types remains.

Helping satisfy this demand and support new standards for cleanliness are touchless sensors that serve as switches from IDEC based on near-infrared (NIR) technology. This is the use of light in the electromagnetic spectrum between 12,500 to 4,000 per centimeter — having wavelengths from 800 to 2,500 nm. In fact, all infrared light is just past that visible to human sight ... and near-infrared light is simply that closest to the human-visible electromagnetic spectrum.



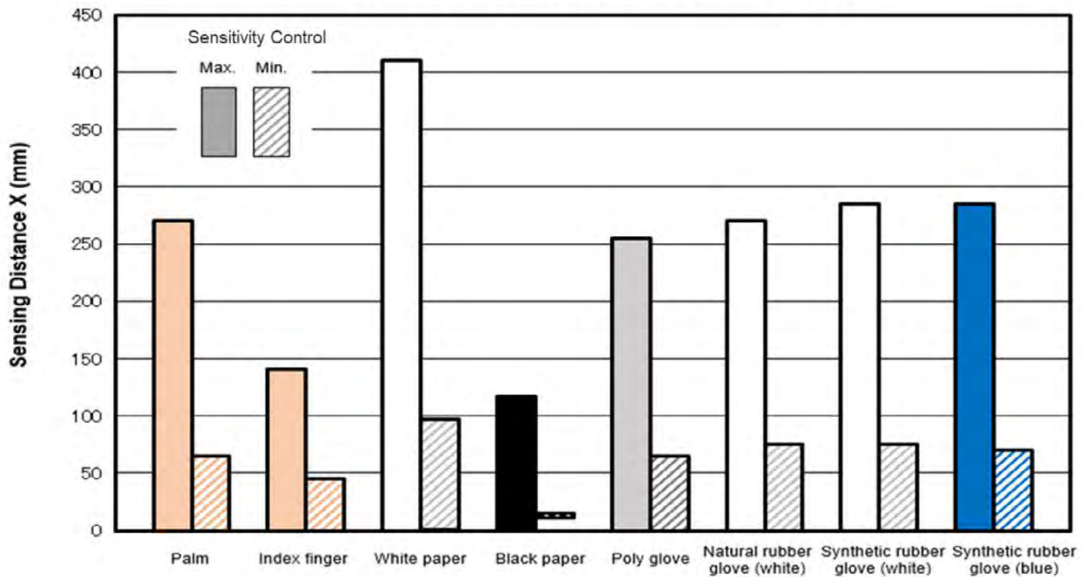
Shown here is an IDEC CW-Series touchless switch. Both PA66 (66 nylon) resin and metal-bodied variations (constructed of aluminum alloy) are suitable for outdoor settings, but the latter is better able to resist vandalism. Ruggedness is rated to IP65/IP67 and Type 4X; resistance to visible light is to an industry-leading 10,000 lux. Detection distance is to 270 mm.

As we'll explore in this white paper, IDEC has leveraged its extensive HMI, switch, and touchless-technology expertise to develop this switch series based on near-infrared touchless sensing. Part of the more extensive IDEC CW series, this product line imparts touchless operation to automated kiosks, control panels, and HMIs in public settings, medical facilities, and industrial food-processing and packaging locations reduce the spread of illness caused by viruses and bacteria.



Even before COVID-19, few people enjoyed touching the surfaces in public restrooms. Touchless switches make such settings cleaner and more pleasant to use.

**Detection distance range of each target**



IDEC touchless switches employing near-infrared sensing can detect wide array of materials.





# PUBLIC SPACES AND THE NEW DEMAND FOR **TOUCHLESS TECHNOLOGY**

Consider the control interfaces of elevators, ATMs, and vending machines in public spaces — some of which are touched by dozens to thousands of people every day. For many of these interfaces, COVID-19 spurred increased use of antimicrobial films — thin adhesive sheets that are intended to slow the spread of touch-borne illness. Such films are especially common on elevator call-button panels. The drawbacks of such films include rapidly diminished efficacy, increase cost, the need for regular replacement, and an unsightly appearance.

In contrast, touchless switches are attractive and maintenance-free — and typically make users more comfortable with the operation of the lift or machine. Touchless CW-series switches from IDEC also sport IP65/67 ratings with UL Type 4X housings for designs such as kiosks and parking meters that must operate outside.



Touchless waste bins have also become increasingly common and reliable in public and private spaces over the last decade. IDEC touchless switches are a suitable solution here — delivering up to 10 years of operation at sustained ambient temperatures to 55°C.



Touchless hand-sanitizer dispensers have become increasingly common since the outbreak of COVID-19.



Manual cleaning of touch surfaces consumes building-staff time ... and accelerates the wear of protective surface finishes.

# MEDICAL SETTINGS BENEFIT FROM MORE **TOUCHLESS TECHNOLOGY**



Touchless controls of medical equipment can reduce the number of times medical personnel need to change their gloves during a given patient encounter.

Consider the group of gram-positive bacteria called methicillin-resistant staphylococcus aureus — also known as *MRSA*. Infections caused by these bacteria are quite difficult to treat, which means hundreds of thousands of people die from *MRSA*-infection complications globally every year. What's worse, antibiotic-resistant bacteria are responsible for [more than a million deaths](#) annually.

In healthcare facilities (including hospitals and nursing homes) *MRSA* and other antibiotic-resistant bacteria are primarily spread by direct physical contact with infected wounds or the contaminated hands of non-symptomatic healthcare personnel.

Here, touchless switches can reduce the number of surfaces otherwise associated with the deposition and transmission of *MRSA* and other infectious agents.

Such touch-free switches also eliminate the hassle of having to rewash and re-sanitize hands after operating a given device — or changing out freshly donned gloves. In some instances, touch-free switches can even reduce the number of times a piece of equipment must be sterilized per day ... or allow for the continued safe and clean use of a piece of equipment that might otherwise be thrown away after a single use.

Avoiding reliance on equipment wipedowns can mean that medical personnel are freed to focus more time on patient care. Plus there's no recurring cost of specialty cleaning supplies ... or risk of an imperfectly cleaned surface, either.



Medical gloves are expensive. Touchless switches can reduce the number of machines that medical personnel need to touch for a given procedure ... for fewer changes of gloves for a given procedure.



Touchless switches also support “wave to open” features on operating-room doors.

Especially in the field of healthcare, eliminating the need for continuous cleaning also prolongs the life of often-expensive medical equipment. In some cases, touch switches subject to frequent sanitation processes are a primary point of finish wear and equipment malfunction ... especially if the cleaning products used include alcohol wipes. Touchless switches avoid this problem.

A final benefit of integrating IDEC touchless switches into medical equipment is how they're especially compact – with a Ø22-mm body (as mentioned), a Ø28-mm exterior face, and 35-mm overall length. That lets medical-device OEMs keep their designs small and light and easy to handle (and transport).



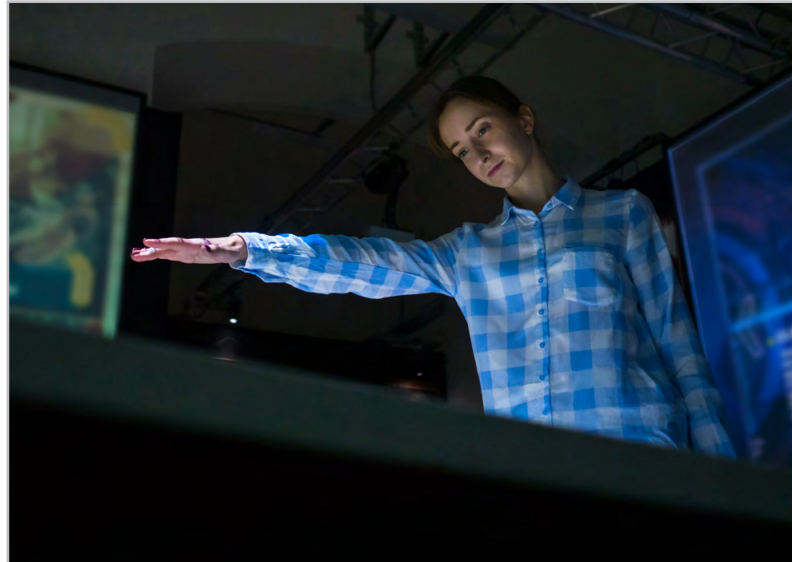


# TOUCHLESS ALSO BENEFITS FOOD PROCESSING AND INDUSTRIAL MACHINE DESIGN

IDEC CW touchless switches are also an excellent fit for settings involving food processing and the maintenance of sanitary equipment – even in the continuous presence of raw meat, fish, vegetables, and processed food ingredients. Here, CW-Series touchless switches can allow gloved machine operators to trigger operations without transferring bits of food to the face of the machine.

In addition, the IP65 and IP67 ratings of CW touchless switches along with smooth monolithic construction make for easy cleanability and ruggedness to withstand washdown. There are also no moving parts or crevices in which food (and bacteria and viruses) can collect.

“ Infrared technology is the most cost-effective option for touchless switches. No wonder infrared-based touchless switches dominate the global industry today. Such switches detect the hands of operators and most objects to work extremely well in the vast majority of cases. ”



Touchless control of industrial equipment is increasingly intuitive for end users.



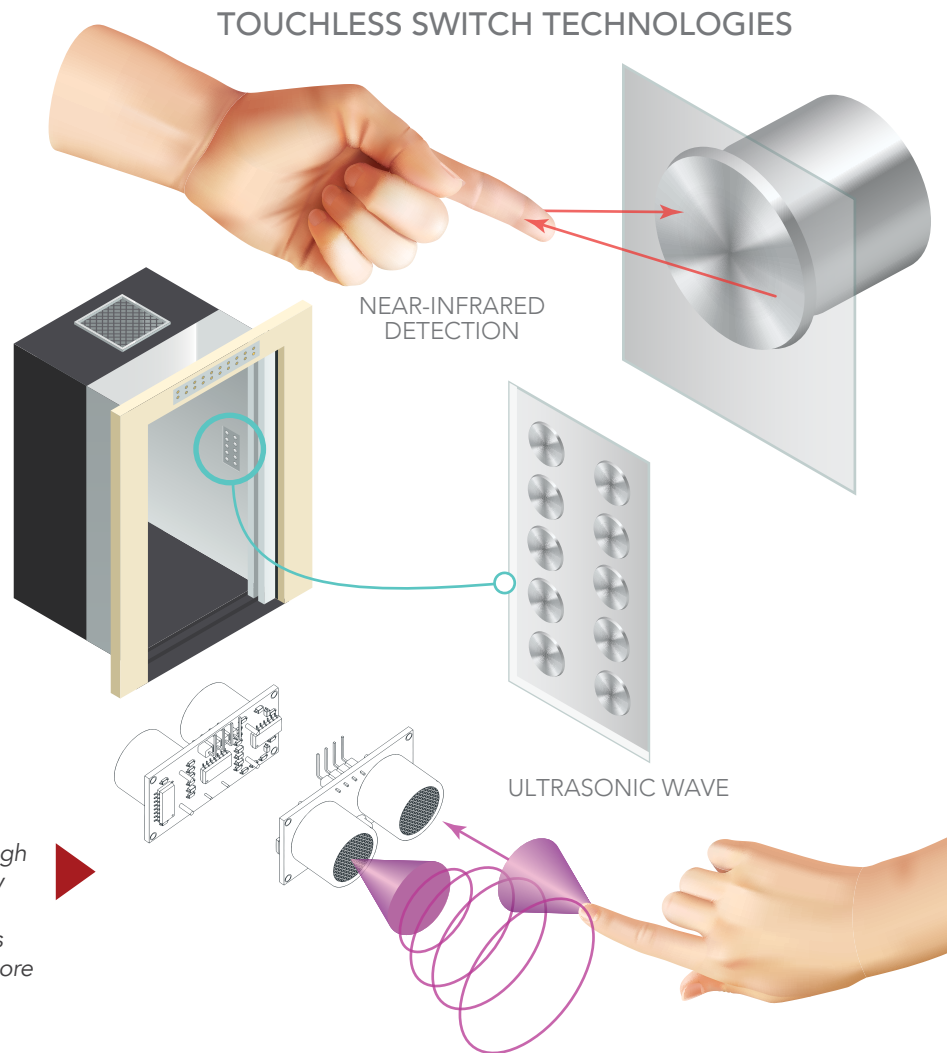
Without careful procedural design, touchscreens can be a source of contamination in food-processing plants.



# WHY USE INFRARED SIGNALS?

Touchless switches today use either magnetic fields (as in capacitive switches), ultrasonic (mechanical pressure) waves, or light as the sensing signal. Of these three, ultrasonic switches are the most accurate. These emit high-frequency sound waves and then scan for waves reflected off a target (such as a human hand) and back to the switch ... using the time that requires (and other wave characteristics) to determine presence, distance from the switch, and more.

*Most commercially available touchless switches are based on near-infrared (NIR) reflection as the detection method. Though switches based on ultrasound technology are more accurate and can sense clear objects such as glass and water as well as matte black objects, they're also much more costly than infrared-based switches.*



Ultrasonic switches can detect clear plastic and even containers of fluid in their sensing zone ... but are challenged by materials that absorb sound and are prohibitively costly for many applications.

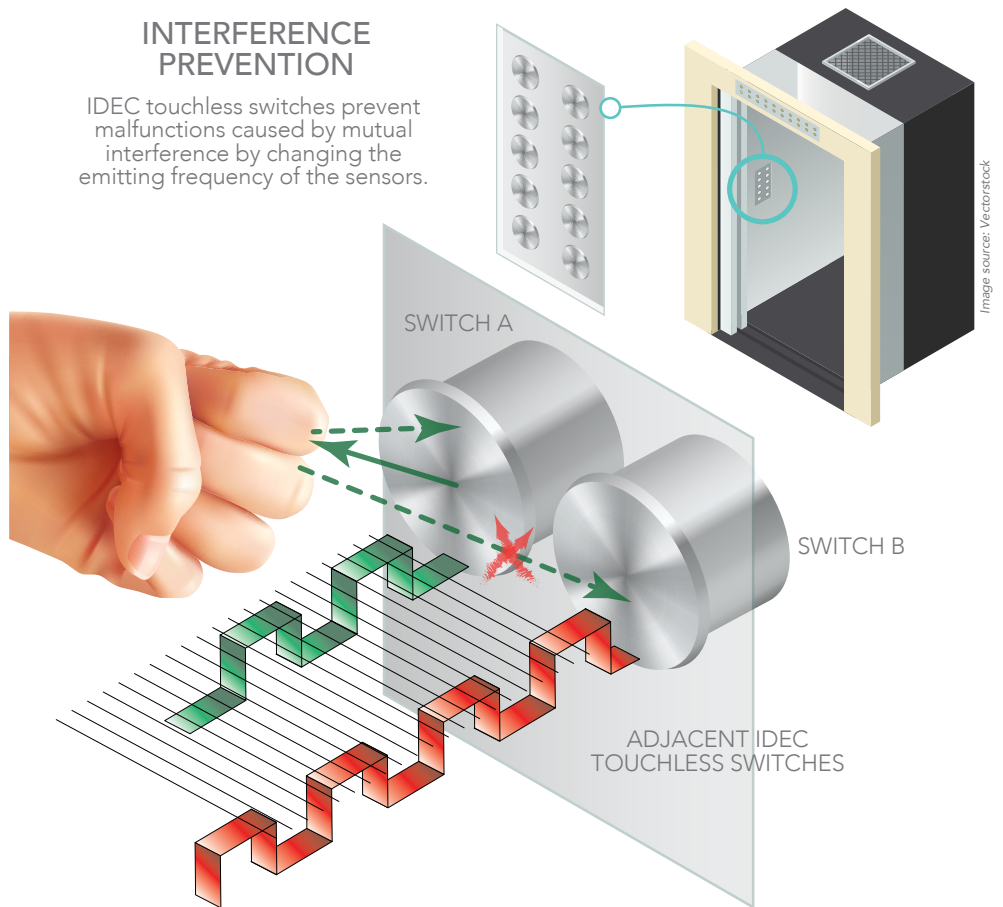
In contrast, near-infrared switches are a cost-effective technology using light transmission and reflection for reliable presence detection. In fact, switch applications for NIR technology are (like switch applications for ultrasonics) a more modest use ... as NIR sensors are used in a very broad array of industrial automation and text and measurement applications for determining the material composition of 3D objects and much more.

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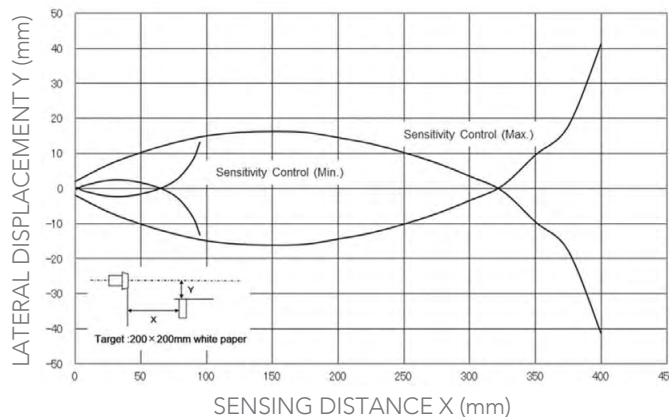
*IDEC CW-Series touchless switches are equipped with a Mutual Interference Prevention Function. Even if two such switches are installed close together, they're unaffected by each other.*

### INTERFERENCE PREVENTION

IDEC touchless switches prevent malfunctions caused by mutual interference by changing the emitting frequency of the sensors.



### DETECTION AREA



In settings where there are more than two switches, reliance on just the interference prevention function is insufficient. Such cases require adjustments to each switch's detection area.



# SPECIFICS OF IDEC'S TOUCHLESS SWITCH SOLUTION

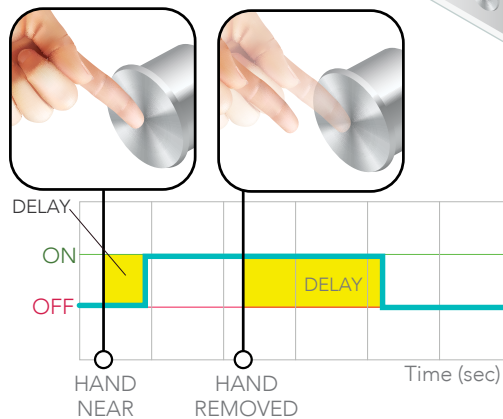
As briefly mentioned earlier in this white paper, IDEC touchless switches based on NIR sensing contain both a broad-spectrum light emitter and a receiver. Light from roughly 800 to 2,500 nm is continually emitted; the switch function is triggered when an operator's hand or other object enters the sensing zone and causes reflection of the emitted light back to the switch's receiver.

Integration of the touchless switches is relatively simple thanks to standard physical geometry and wiring; a cable connector is included as an optional feature for OEMs who can benefit from quick switch connectivity.

## TIMER FUNCTION

IDEC touchless switches timer delays prevent malfunctions caused by:

- Accidental operator activations
- Control *chattering*



A time delay CW-Series switch variation is available. These are suitable for applications or designs that can't justify the inclusion of a PLC to impart such a function.

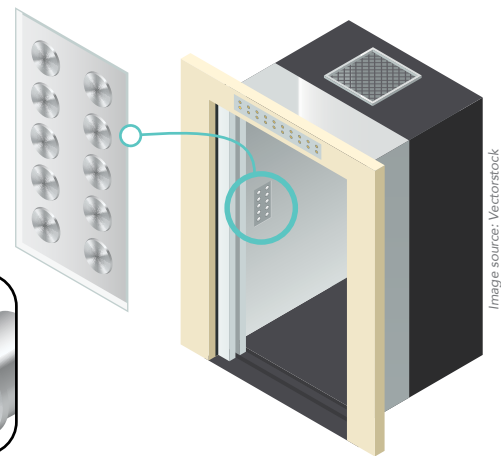


Image source: Vectorstock

There are some design caveats of note: First of all, sensing distance varies depending on the target object's reflectance. In addition, groups of switches mounted close together (as on an elevator call-button panel) require careful setting of each component's sensing distances to avoid interference. If a design only requires a bank of two switches, a mutual interference prevention function (which sets the switches emitting frequency at different values) renders this extra step unnecessary.

*This chart lists the specifications for four different CW-Series touchless switch models.*



Specifications				
TYPE No.	CW1H-DM1NGR-C	CW1H-DM1TGR-C	CW4H-DM1NGR-C	CW4H-DM1TGR-C
Ambient Temperature	Operating: -25 to +55°C, Storage: -35 to +70°C (no freezing)			
Ambient Humidity	Operating: 35 to 95%RH, Storage: 35 to 95%RH (no condensation)			
Detection System	Diffuse-reflective			
Adjustment range of Maximum sensing range	120 to 350mm [using white mat paper, 200×200mm] If detection object is hand, approximately 70 to 270mm (reference value)			
Light Source	Infrared LED			
Power Voltage	12 to 24V DC Ripple ±10% (main circuit and illumination part)			
Current Consumption	40mA maximum (main circuit), 20mA maximum (illumination part)			
Control Output	Solid State Relay (PhotoMOS) output Load voltage: 26.4V DC maximum		Voltage drop : 1.0V maximum Rated operational current (Load current): 100mA	
Protection Circuit	Protection circuit on reverse connection of power supply			
Response Time	Turn on ≤ 2.5ms, Turn off ≤ 1ms			
ON Delay	-	0.5±0.1s	-	0.5±0.1s
OFF Delay	-	2.0±0.5s	-	2.0±0.5s
Material	Bezel • Body	PA66		Aluminium alloy
	Lens	PMMA		
Light color	Light1: Green, Light2: Red			
Degree of protection	IP65, IP67, UL, Type4X (OUTDOOR USE) ※Front panel			





## Company and Contact Information

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The touchless switches detailed in this white paper are an extension of IDEC's existing CW Series switch and pilot-device product series.

IDEC Corp. is a global supplier that has provided innovative and reliable industrial automation and control products since 1945. Covering a broad range of market needs, these feature-rich and value-driven products include PLCs, human machine interfaces (HMIs), safety products, switches, relays, and other industrial automation components.

By delivering world-class products backed by personalized service and highly-rated technical support, IDEC helps design engineers create lean, cost-effective, and safe solutions to optimize automation applications. With the recent acquisition of APEM, one of the world's

leading manufacturers of operator-interface panels and related components, IDEC continues to enhance customers' ability to create high-quality solutions. For more information, visit

<https://apac.idec.com/>.

As with all its products, IDEC offers free tech support for CW-Series touchless switch products with no service or support contract required. For complete specifications or additional information on touchless switches, contact

IDEC IZUMI ASIA PTE. LTD. at +65 6995 1155 or visit

<https://apac.idec.com/>.