

## HOW HUMAN BODY TEMPERATURE SCREENING CAN SUPPORT THE SAFE REOPENING OF BUSINESSES AND PUBLIC FACILITIES

With businesses around the world looking to reopen after lockdowns to prevent the spread of COVID-19, many institutions are following government guidance to implement a range of measures designed to limit the spread of the virus.

The core advice is around social distancing, hand hygiene, and wearing of face coverings. While this guidance will continue to be important, these methods are not always practical in many enclosed spaces and environments – including offices, factories, shops, and leisure facilities – where the virus is more easily spread.

At the same time, indefinite lockdowns and restrictions of movement, commerce and leisure have extremely damaging social and economic effects.

As a result, finding suitable measures to diminish the spread of the virus amongst staff, customers and visitors to commercial premises will help increase the resilience of the business and maximise its ability to remain open.

One of the most effective supplementary measures to provide this additional resilience is human body temperature screening, which is recommended by government authorities in many areas of the world, including the USA. An elevated temperature



can indicate symptoms of viral infection. However, this screening must be implemented using suitable equipment and an adequate process in order to operate effectively.

### CORE PRECAUTIONARY MEASURES

The primary advice on preventing the transmission of COVID-19 centres on social distancing, hand hygiene, and face masks, all of which have their attendant benefits and drawbacks.

The World Health Organisation (WHO) recommends social distancing of one metre (approximately three feet), but guidelines vary, with many governments stipulating greater distances during the peak of the outbreak in their country.

This guidance appears to be founded on an article in the medical journal The Lancet, which gave the risk of infection at one metre as 13%, falling to 3% beyond that distance.

The use of larger social distances imposes severe limitations on

the number of people who can attend a site, and the activities they can be involved in once there. Thus, as restrictions ease, social distance advice typically reduces the distance to one metre.

However, even at this distance, many activities become a cause for concern, despite having not been considered high-risk previously. For example, getting a haircut or manicure, or playing some sports are simply not possible while maintaining a safe social distance.

Hand-washing and sanitising also helps limit the spread of COVID-19, but is not an infallible measure. A brief,

unconscious touch of the face can transfer the virus to freshly cleaned hands, ready to be transmitted to any surface which is then touched.

COVID-19 is known to be highly resilient in many environments – according to the WHO, it may remain infectious for anything between two hours and nine days – so it requires a constant effort to maintain a sanitised environment. In high-traffic areas, this may be even more difficult to sustain.

Well-fitted face masks are effective in limiting the spread of exhaled virus particles from people who are infectious, reducing the contamination of the surrounding area.

However, they tend to be universally sized, so may provide



a poor fit for many individuals, while others are unwilling to, or have underlying health conditions that make their use impractical.

Additionally, the virus may concentrate on the face covering or mask of an infectious person, so inadvertent contact with the outside of the mask could increase the risk of transmission.

## DIFFICULTIES OF TESTING FOR THE VIRUS

Accurate testing for COVID-19 is available, but impractical for businesses to apply as a front-line precaution. Current methods require laboratory processing, and take a significant amount of time – from many hours to several days – to verify.

Antibody tests deliver a quicker result, but require a blood sample via pin prick testing, which may dissuade some customers and is far from ideal as a universal solution in all situations.

Additionally, there is insufficient evidence to conclude that prior infection provides a person with long-term immunity,

so an antibody test does not prove that there is no current infection, nor any risk of re-infection.



## HUMAN BODY TEMPERATURE SCREENING

Implemented alongside the core countermeasures, human body temperature screening can be accomplished by a number of different methods, with variable levels of accuracy, reliability, and ease of use.

One of the most accurate, but least practical, methods is to use a calibrated rectal thermometer to measure core body temperature. However, this is far from ideal in encouraging staff, customers or visitors to return to a business or leisure facility.

Non-contact thermometers offer a more practical solution, but rarely offer the accuracy level required. Many of these instruments have a margin of error of  $\pm 2$  °C ( $\pm 3.2$  °F) or larger, which is likely to generate a significant number of false positive or false negative readings when trying to detect elevated temperatures.

The manual operation of these devices creates a large variance in results – for example, should the person performing the measurement take the reading from near the nose rather than

the forehead, they will obtain a lower temperature reading. Coupled with the inherent inaccuracy of the device, this makes the risk of a false negative reading much greater.

Additionally, these portable handheld devices require social distancing guidelines to be broken, with the operator needing to get much closer than one meter to obtain the measurement. This increases the infection risk both to the person carrying out the measurement, and to everyone entering the building.



A measurement of much greater accuracy can potentially be obtained using non-contact infrared thermometers and imagers. However, in order to be truly effective, this sort of system requires serious design consideration in order to overcome the challenges of non-ideal conditions.

The ideal conditions for this method would typically require a dark room – to remove solar radiation and reflections – with a constant ambient temperature. The individual being measured would remain in one place (for example, by being restrained) for several minutes while the process took place.

The reason for this is that the amount of heat energy radiated by the human body is relatively low, so surrounding environmental conditions, such as sunlight and reflected heat, can make it difficult to detect and measure accurately.

To overcome this issue in non-ideal conditions – that is, those found in the real world – it is necessary to integrate a black

body heat source. This is a precision-engineered component that reference heat source to a very tight tolerance.

The black body is integrated so that it remains “in scene” – within the field of view of the thermal camera while it measures a person. As long as the distances of the camera from both the black body and the individual being measured are known, the temperature measurement can be calibrated in real time, despite the non-ideal conditions. This is accomplished using a feedback loop and algorithm in the system’s associated software.

A unit using an integrated, in-scene black body at a specified fixed distance removes potential errors found in complicated software set-ups where the black body is a separate unit that can be mounted in differing relative distances to the thermal imager due to the installation location.

## TEMPERATURE SCREENING BEST PRACTICE

To provide the most resilient defence against COVID-19, it is essential to implement effective measures to limit the spread of the disease, particularly in businesses and public facilities.

The greater the number of these countermeasures that can be implemented at a site, the greater the resilience that site will have.

Nonetheless, none of the precautions mentioned here can provide complete protection, either alone or as a collective package of measures – their key purpose is risk mitigation.

Temperature screening can play a vital role in this, but if it is put in place using low-accuracy handheld thermometers or fixed systems that lack in-scene black body calibration, the risk of infection could be increased rather than reduced.

However, a human body temperature system that implements both the equipment and process with a clear understanding of both the benefits and limitations of the system can be a powerful tool that strongly supports other risk-reduction precautions.

### Disclaimer

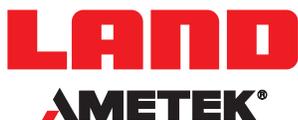
The VIRALERT 3 Temperature Screening System is not a medical device. It cannot detect COVID-19 or any other diseases. AMETEK Land are not medical experts. AMETEK Land are trusted experts who have provided accurate, repeatable temperature measurement instrumentation to industry since 1947. The VIRALERT 3 Temperature Screening System incorporates an ‘in-scene’ thermal calibration heat source to provide greater accuracy when measuring subjects for elevated body surface temperature which can indicate a fever. We recommend that all elevated temperature readings are verified with an approved and calibrated medical thermometer. References have been provided for official sources of advice for some of the issues highlighted in this article. We strongly recommend that you to refer to these references and other appropriate reference sources relevant to your specific country, state or county for full and further advice.

### References

Lancet - Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis - <http://www.thelancet-press.com/embargo/physicaldistancing.pdf>

WHO social distance guidance - <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

WHO face coverings guidance - <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks>



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