

Dräger Interlock XT – contributing to improved road safety

Figure 1: Submitting a breath sample to the Dräger Interlock XT



Figure 2: Dräger Interlock XT installed in a vehicle

Every year, more than a million people worldwide lose their driving licence as a result of driving under the influence of alcohol. In Germany, for example, there are 70,000 road accidents a year involving people who are alcohol-impaired. For more than 10,000 people in the European Union and more than 15,000 people in the USA, these alcohol-related accidents prove fatal. In view of these worryingly high road traffic accident and fatality statistics attributable to alcohol, attempts have been made in recent years to find ways to reduce the figures. In North America large numbers of so-called interlocks (alcohol ignition interlock devices) are used to prevent alcohol-

impaired drivers from starting and driving their vehicles.

In most US states, interlocks are a legal requirement for repeat offenders who have been prosecuted for driving under the influence of alcohol, and today some 60,000 interlocks from different manufacturers are in use. Some Canadian provinces have also chosen to use interlocks under driver licensing law, while Australia and a number of European countries – Sweden, for example – are currently planning or running test programmes.

The worldwide experience of interlocks to date and recommendations for countries looking at introducing this system are de-

scribed in considerable detail in a position paper published by the International Council on Alcohol, Drugs and Traffic Safety (ICADTS) [1]. Furthermore, the European Commission has ordered a feasibility study to be carried out to investigate the introduction of alcohol interlocks [2].

What is an interlock?

An interlock is a breath alcohol measuring instrument with vehicle immobilizer (Figure 1) which can be easily installed in a motor vehicle. Before the vehicle can be started, a breath sample has to be given. Once the breath alcohol measurement has been performed (Figure 2), the interlock pre-

vents alcohol impaired drivers from starting the engine.

An interlock comprises two main components: the breath alcohol measuring instrument with the measuring system and with the display, which is situated inside the vehicle (Figure 3), and the central unit which is generally installed under the dashboard and allows or prevents current being supplied to the vehicle's starter system. When the ignition is switched on, the interlock requests a breath sample from the driver (Figure 4). The result of the breath alcohol concentration measurement determines whether the vehicle's starter is released and the engine can be started.

The new Dräger Interlock XT

Drawing on its 50 years of experience in the area of breath alcohol concentration measurement, Dräger developed the Interlock XT. The device meets all worldwide interlock requirements, offers the greatest possible convenience for the user and is even tamper-proof – thus setting new standards for alcohol interlocks.

Measuring the alcohol concentration

The Dräger Interlock XT determines the breath alcohol concentration by means of an electrochemical DrägerSensor. The sampling system conveys a breath sample of a precisely defined volume to the electrochemical sensor similar to the one used in the Alcotest 7410 screening device [3,4] and the Alcotest 7110 Evidential [5]. The sensor determines the ethanol content of the breath sample selectively and with a high degree of accuracy.

The sensor contains an electrolyte-soaked membrane which carries the measurement electrode and the counter-electrode. The electrolyte and the electrode material are chosen such that the alcohol to be analysed is oxidized electrochemically on the catalyst layer of the measurement electrode. The electrons released from the reaction at the electrode dissipate as current through the connecting wires to the instrument's

electronics. When the sensor current is analysed the entire electric charge generated during the electrochemical reaction is determined. This coulometric measurement method gives the sensor its particular long-term stability, meaning that the Dräger Interlock XT boasts a six-month calibration interval. Towards the end of the calibration interval, the user is informed in good time on the full text graphic display screen. The electrochemical sensor only reacts with high specificity to alcohol. As a result, acetone, for example, which can be found in the breath of diabetics and those on starvation diets, cannot distort the measurement result because the ketone group

does not react at the electrodes. This prevents any incorrectly positive measurement results.

During development of the Dräger Interlock XT, particular attention was paid to ensuring that the instrument would be ready for use quickly, as car drivers find long waits after switching on the ignition particularly annoying. At normal or high ambient temperatures, the Dräger Interlock XT is ready for use within just 10 seconds. To allow a quick and reliable measurement at low temperatures too, the sensor and parts of the sampling system are heated. Even at -10 °C, the waiting time is only around 60 seconds. And because the Interlock even works



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Figure 3: Dräger Interlock XT

perfectly at -40 °C (during the Scandinavian winter, for example) and at 85 °C (in blazing sunlight, for example), it was given the name "XT", for "eXtended Temperature".

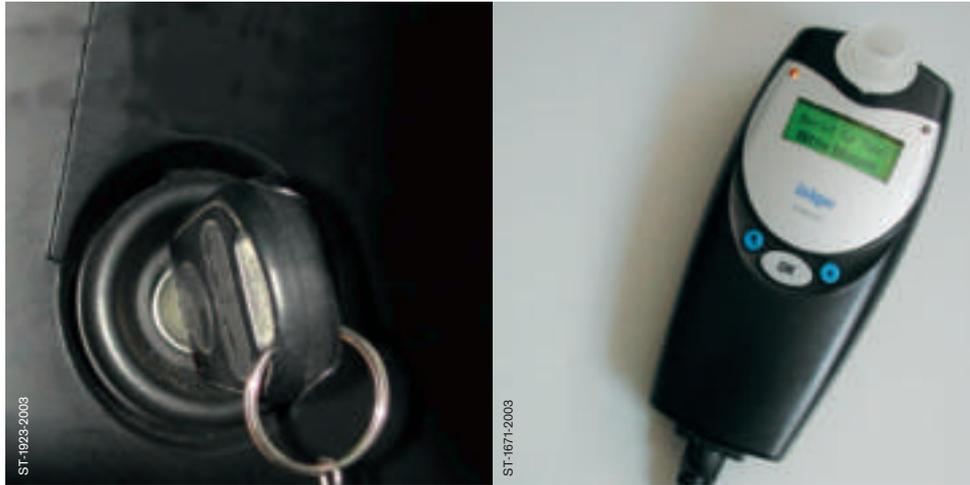
Effects of residual alcohol

If any residual alcohol or other substances in the mouth cause the starting motor to be blocked, a repeat breath sample can be given after 10 minutes. During this period the driver must not smoke, drink or eat anything. After this time, it is certain that any residual substances will have been completely removed from the mouth and throat, so the test result can no longer be affected.

Installation

For installation of the Interlock XT, the voltage supply between the vehicle's ignition switch (position starter relay) and the starter system is interrupted. This means that no voltage is supplied initially to the starter system when the key is turned to the starter position, so no voltage is available to start the starter motor (Figure 5). The Interlock is fitted into the interrupted

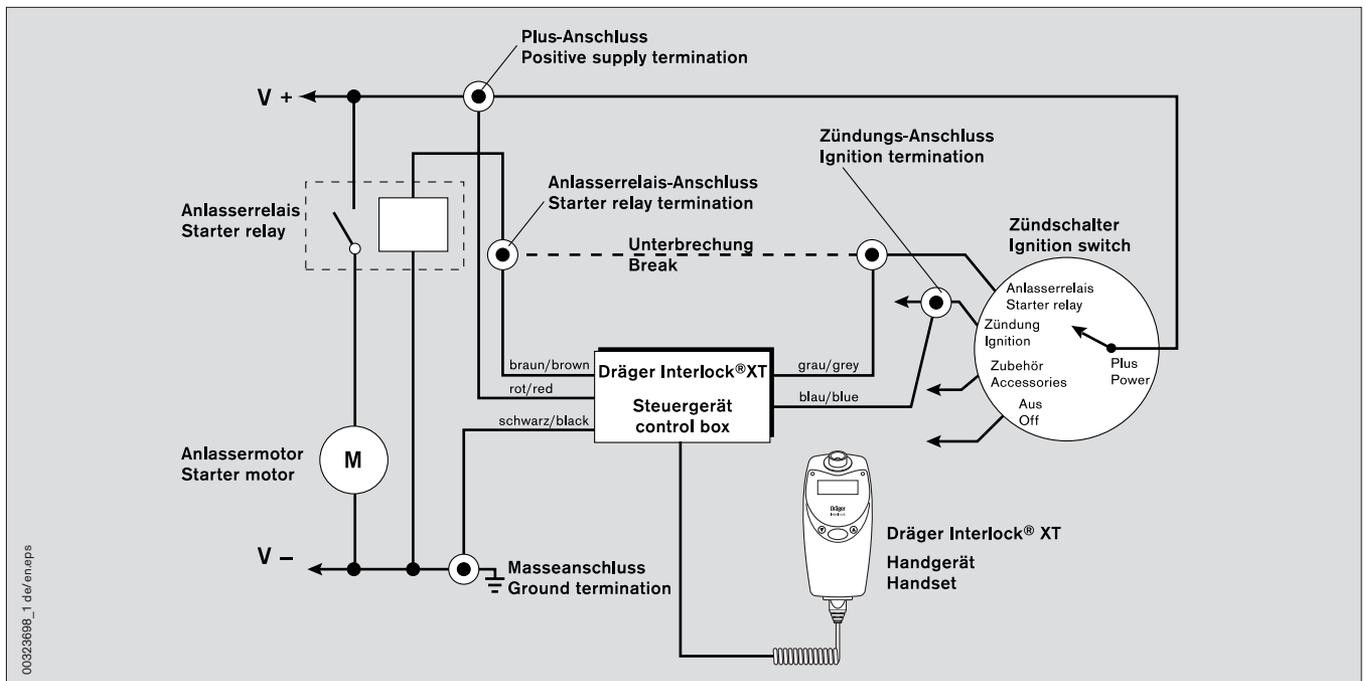
Procedure for Interlock use



1 Turn ignition key

2 Receive request to blow into Dräger Interlock

Figure 5: Installation circuit diagram for Dräger Interlock XT





3 Measurement of the breath alcohol concentration



4 Breath sample accepted: motor starter released



5 Start engine

circuit with a relay that only releases the voltage supply to the starter system when a breath sample with a sufficiently low breath alcohol concentration has been given. This installation procedure ensures that an Interlock can only ever intervene in the engine starting process but can never influence a running engine, i.e. while the vehicle is moving. This is an important argument for the operational safety of the Interlock.

Adjustable parameters

Using special software, authorized service centres can set a number of parameters in the Dräger Interlock XT. The set values for the parameters, for example, can be defined by the authorities if the Interlock is to be used in the area of driver licensing law. In its default setting, the instrument does not display the measured breath alcohol concentration, but states merely whether the measured concentration is above or below the set limit value. This is designed to prevent a driver from using the Interlock to drink up to (but not exceed) the concentration limit. The Interlock uses the lowest relevant limit value, for example in Germany of 0.3 ‰ or 0.15 mg/l.

For a period of 15 minutes after the engine has been switched off, the vehicle can be started again without the need for a repeat breath sample. This is in the interests of road safety, allowing the vehicle to be started again immediately if the engine stalls in a critical situation or after brief stops.

To ensure that the driver remains under the legal limit even during longer journeys, the Dräger Interlock XT can be set to request repeat breath samples at random intervals. Even if the breath sample is not successful, however, the running engine will not be stopped. Instead, the Interlock's data log records that a breath sample has been refused or that the alcohol concentration measured was too high. This allows the data to be analysed subsequently and such incidents being detected.

Furthermore, an intelligent code-controlled access system can be activated in the Dräger Interlock XT. For a limited time after a code has been entered, this allows a workshop mechanic, for example, to start the vehicle without giving a breath sample. The code is always unique and can only be used for a particular Interlock for a particular period of time.

Data log and data record

While the vehicle is in use, all relevant incidents are recorded in the Dräger Interlock XT's data log. The memory capacity can store more than 30,000 sets of data. The data recorded are the date, time, submission of or refusal to submit a breath sample, measured alcohol concentration, engine starts and stops, electrical bypassing of the Interlock and any other attempts to tamper with the device. Because these data are stored in the central unit permanently mounted in the vehicle, data logging continues even if the handset is removed. If so desired, an authorized service centre, using special software, can download the data via an infrared interface, compile a data record and then print it out. When the Dräger Interlock XT is used in the area of driver licensing law, this record can be sent to the driver vehicle licensing authority or other supervisory body for analysis, allowing proper use of the vehicle fitted with the Interlock to be monitored.

Areas of application for Interlocks

There are two distinct areas in which Interlocks may be used: as a preventive

measure or as ordered by a court under driver licensing law.

Installing an Interlock as a preventive measure in transport vehicles such as hazardous goods transporters, lorries (Figure 6), coaches and taxis can reduce accident damage and downtime, improve the image of the transport company, and make customers feel safer. In private vehicles driven by persons with a possible or recognized alcohol problem, the voluntary installation of an Interlock as a preventive measure can help the person to overcome their problem and can give considerable reassurance to partners (Figure 7) or to parents, for example, whose children also drive a car.

The second area in which Interlocks are used is when a court or other authority



Figure 7: Preventive use of a Dräger Interlock XT



Figure 7: Use of Dräger Interlock XT in the transport industry

orders an Interlock to be installed in the vehicles of drivers who have a history of offences due to driving under the influence of alcohol. Discussions about this type of use have recently started in Europe, too, and in some European countries preparations are currently underway to change the laws accordingly. ■

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Conclusion

The Dräger Interlock XT is a state-of-the-art interlock device which is quickly ready for use even under extreme temperature conditions, prevents tampering and, thanks to its Dräger-Sensor, offers long calibration intervals.

Installing a Dräger Interlock XT is a reliable means of avoiding accidents caused by alcohol, as it can immediately separate alcohol consumption from driving. What is more, the Interlock can support long-term behavioural changes with relation to alcohol consumption, thereby making an important contribution to improving road safety.