



VARIMETER PRO

Universal measuring relays
One device, many functions

VARIMETER PRO: The multifunctional measuring relay

Complex processes in automation, process and industrial building systems, together with increasing demands in energy and environmental engineering require high operating reliability and permanent availability of the system.

The universal measuring relays MK 9300N / MH 9300 of the **VARIMETER PRO** series monitor up to 9 different parameters simultaneously. Quite simply and without much wiring effort. Whether simultaneous overvoltage/undervoltage, voltage asymmetry, overcurrent/undercurrent, cos phi, active power, apparent power and reactive power, frequency and phase sequence in three-phase and single-phase networks - a measuring relay for all scenarios.

Thanks to its menu structure the measuring relay can be operated easily and intuitively.

Your benefits at a glance:

- ▶ Simultaneous monitoring of up to 9 measured variables
- ▶ Overvoltage, undervoltage or window monitoring
- ▶ Simple parametrisation and fault diagnostics on the device
- ▶ Differentiated fault messages
- ▶ Large measuring range 3 AC 24 ... 690 V
- ▶ Large auxiliary voltage range
DC 24 V, AC 230 V or AC/DC 110 ... 400 V
- ▶ Variable terminal configurations through plug-type screw or spring-loaded terminals

Your benefit:

- ▶ Early detection of irregularities protects your equipment
- ▶ Timely intervention increases the availability
- ▶ Cost-effective and space-saving
- ▶ Reduced wiring effort



Certified Safety Standards

The multifunctional measuring relays MK 9300N and MH 9300 of the VARIMETER PRO series are certificated according to DNV for use on ships.



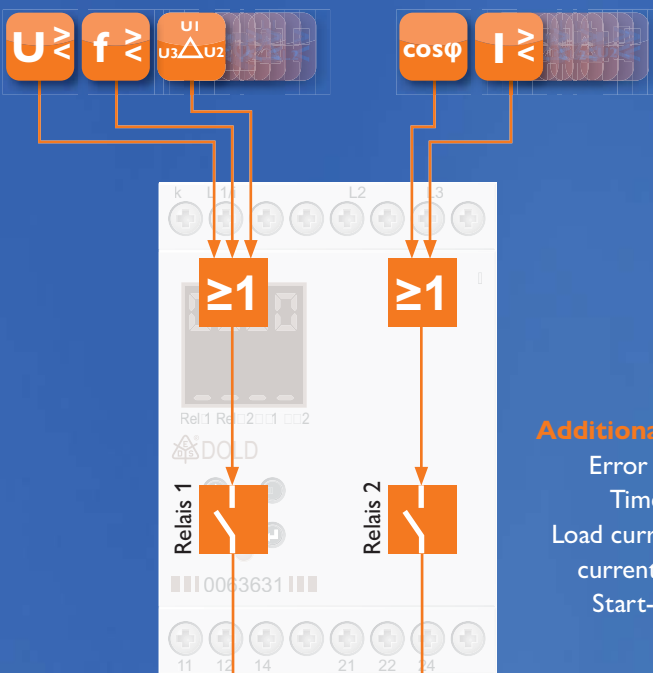
Function principle

1 Selecting measuring functions

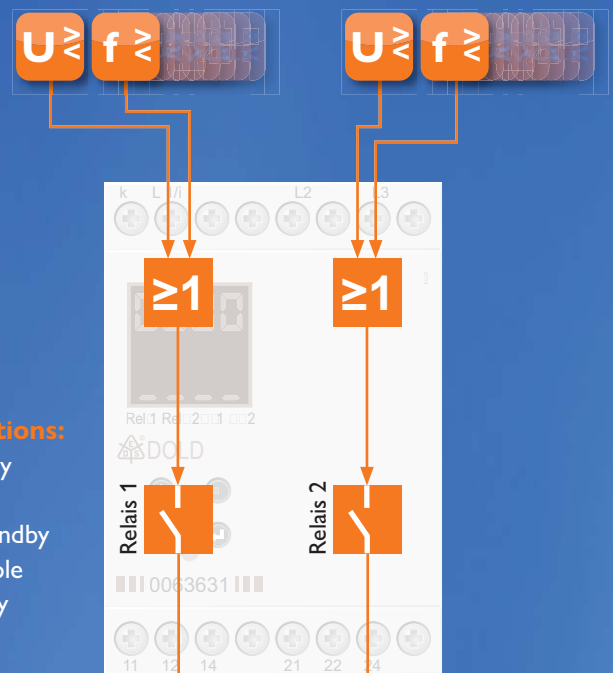


2 Defining measured variables and limit values

Example of a common application



Example of advanced warning and alarm message



Additional functions:

- Error memory
- Time delay
- Load current/Standby current principle
- Start-up delay

3 Allocation of the measuring functions to the outputs



Each relay can be assigned up to 9 measured variables. If in this example the measurement lies outside the limit values of voltage or frequency or asymmetry relay 1 switches. If the limit values of $\cos\phi$ or current are exceeded relay 2 switches.

By assigning the same measured variables to both relays the device can also be used for advanced warning and alarm-signals. In this example voltage and frequency are monitored. Advanced warning is triggered when the limit value of one of the two measured variables on relay I is exceeded. If a limit value of the measured variables on relay II is exceeded the device outputs an alarm signal.

Maximum output function for your application



Refrigeration lorry

Connecting the refrigeration unit of the lorry to the mains during loading and unloading to preserve the vehicle battery.

- ▶ **Solution:** Monitoring for correct phase sequence of the three-phase current supply to prevent the compressor from sustaining damage.
- ▶ **Advantage:** disruption of the cooling chain of the cargo is prevented.

Precise monitoring and diagnosis in machines and plants has gained increasing significance over the past years.

The early detection of impending failures and preventive maintenance prevent costly damages.

The VARIMETER PRO is the basis for reliable monitoring.

As user you will benefit from the operating reliability and high availability of your system.

Secure this economic advantage.



Pumping unit

The pump motors must be switched off when one phase fails.

- ▶ **Solution:** Monitoring for asymmetry and undervoltage. After the voltage returns the individual pumps shall be switched on again in a staggered time frame.
- ▶ **Advantage:** Preventing motor damages due to overheating. Relief of the feeding mains by pump start with time offset.



Signal systems

Absolute operating reliability is required for traffic lights, obstacle and tarmac lighting.

- ▶ **Solution:** Monitoring of undercurrent to detect disconnects or defective loads.
- ▶ **Advantage:** Preventing fatal consequences for traffic safety. The response thresholds can be adjusted individually to the load to be monitored.





Mill drives

Large drives such as grain or cement mills often still use slipring rotor motors.

- ▶ **Solution:** Employing a frequency monitor to control the ramp-up.
- ▶ **Advantage:** A soft start of the working equipment preserves the mechanical drive elements and prevents current peaks in the feeding mains.



$U \geq$ $f \geq$ $I \geq$

$I \leq$ $\cos\phi$ $U_1 \Delta U_2$

$P \geq$ $U_1 \Delta U_2$



Fan drives

Fans and blowers are often driven via V-belts. A torn V-belt or clogging of the filter interrupts the continuous flow of the delivery medium.

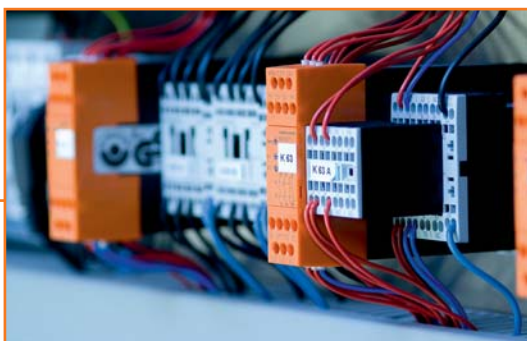
- ▶ **Solution:** Monitoring for underload with cos guard.
- ▶ **Advantage:** Dispensing with external sensors, e.g. pressure transmitters. Quick correction of the malfunction through timely warning of the service personnel.



Crusher

Granulators and crushers must be monitored for material jams or blockage because machine and motor would be at risk in these conditions.

- ▶ **Solution:** Measuring the active power consumed or the overload or underload.
- ▶ **Advantage:** Preventing overheating and thus winding damages of the motor. Energy savings through automatic cut-off of the drive during work breaks. Preventing mechanical damages through the timely shut-off of the drive.



$U \geq$

Contactors controls

Contactors controls are the basis of control technology. Their flawless functioning is therefore important.

- ▶ **Solution:** Monitoring for overvoltage and undervoltage. The machines are shut down and restarted in a controlled manner with the help of undervoltage relays. Overvoltage relays protect the machines and ensure proper operation.
- ▶ **Advantage:** Avoiding hazardous conditions for personnel, machines and manufactured products. Preventing device destruction through overvoltages.

Technical data



MK 9300N

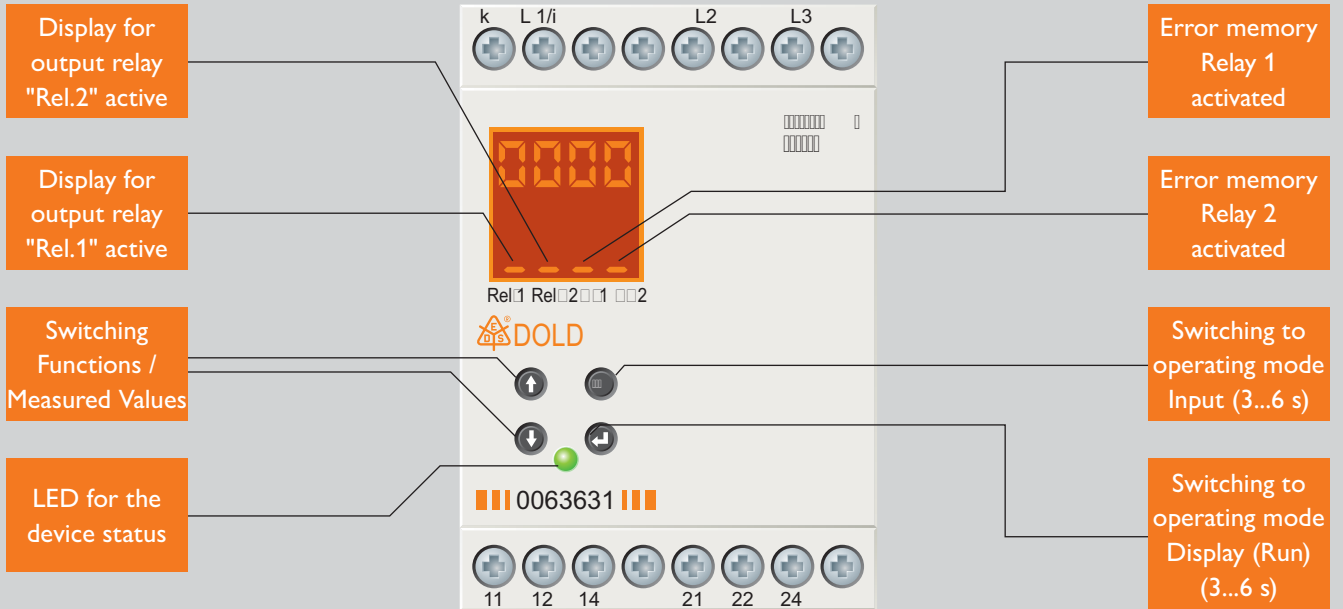
MH 9300

Features

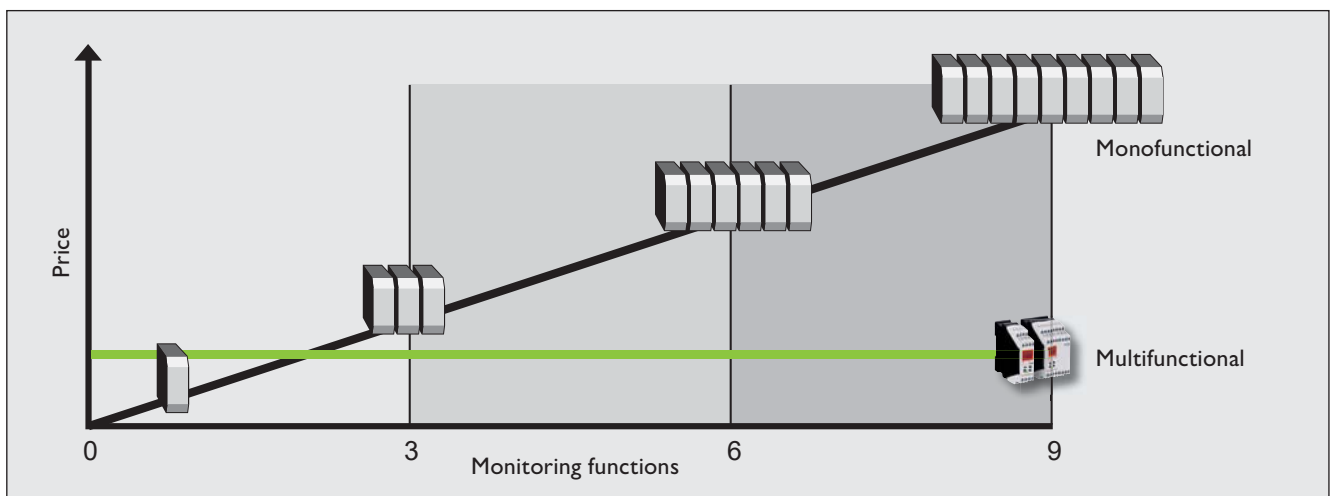
- According to EN 60255, VDE 0435
- Voltage monitoring (1-phase and 3-phase)
- Current monitoring
- Frequency monitoring
- Phase angles $\cos \phi$
- Phase sequence, phase failure, asymmetry
- Active, reactive and apparent power
- Startup delay
- Response delay
- Adjustable hysteresis at MH 9300 for Relay 1 / Relay 2 separately adjustable
- Error memory
- LCD display for the current measured values
- Relay function load current/standby current selectable
- Optional with plug-in terminal blocks for quick device exchange
 - with screw terminals
 - with cage clamp terminals
- MK 9300N: 1 changeover contact width 22.5 mm
- MH 9300: 2 x 1 changeover contact width 45.0 mm



Device setting



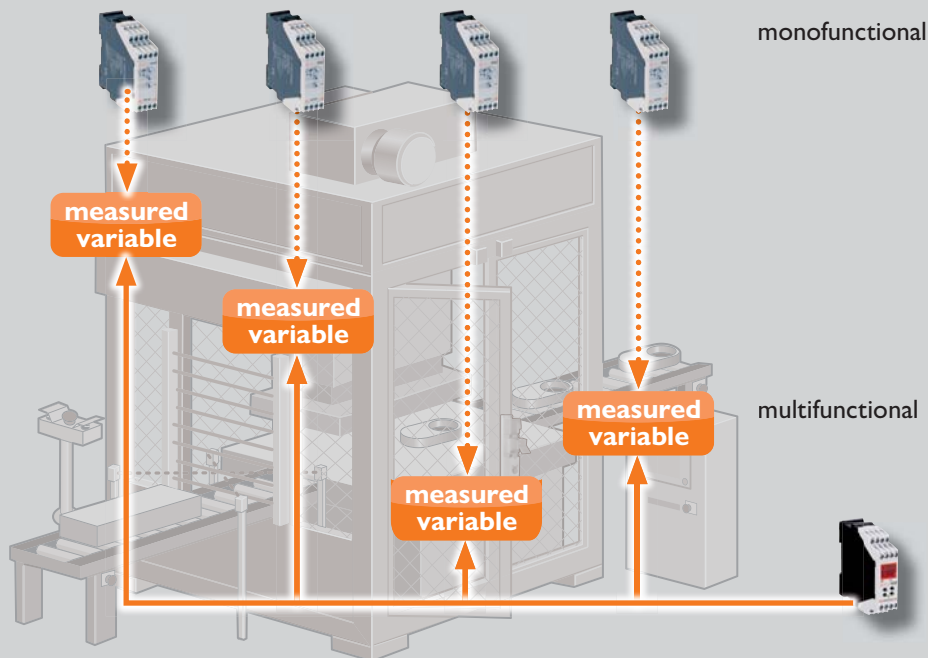
Comparison Flexibility – Price



The right solution for each requirement: The VARIMETER PRO from DOLD is unbeatable in the price-performance ratio if several monitoring functions shall be carried out simultaneously. DOLD offers the perfect solution as well for all monofunctional measuring tasks. Please ask us.

Our experience. Your safety.

The right solution for each application



A monofunctional device is the ideal solution if only one measurement needs to be monitored.

However, if different parameters need to be monitored at the same time, the multifunctional devices from DOLD are the first choice in terms of flexibility and price-performance ratio.

Examples for additional innovations for your safe complete solution:



Insulation and differential current monitors



Time control technique



Fault annunciators

Wherever machines need to be protected against damages and productivity shall be increase or maintained DOLD measuring and monitoring equipment has been used successfully worldwide for many decades. Apart from a variety of devices with standard functions DOLD can fall back on many years of experience in developing tailored and economical problem solutions.

What can we do for you?

Challenge us. We look forward to it!

DOLD

E. Dold & Söhne GmbH & Co. KG
Bregstraße 18 • D-78120 Furtwangen
T +49 7723 654-0 • F +49 7723 654-356
dold-relays@dold.com • www.dold.com