THE APPLICATION
OF TECHNOLOGY

KEHUI

PRODUCT OVERVIEW

Kehui International

Kehui International, Ware, UK

Kehui factory, Zibo, China

In the Chinese language, Kehui literally means the Application of Technology. This phrase perfectly defines the company's commitment to technological innovation, which it accomplishes whilst achieving the highest levels of quality.

The company was founded in 1991 as a joint venture with a major US organisation, before becoming independent in 2005. It has utilised the best of Asian, European and American expertise to develop a selection of cable and transmission line fault locators, as well as equipment for the automation of electrical distribution systems and its range of switched reluctance motors.

Cable Fault Location

Cables are a fundamental part of the electrical power system, delivering electricity discretely, whilst improving the environment by displacing unsightly overhead lines. However, their invisibility comes at the cost of making it more difficult to locate and repair the faults that they may incur. A faulted cable brings the inconvenience of a loss of supply, but where the load is critical, this inconvenience becomes far more critical. Furthermore, the deregulated industry has led to the imposition of financial penalties on power companies in the event of a power failure. As a result, there is a lot of pressure to quickly find the fault and Kehui addresses this need for swift fault location through its range of products.

T-906 Automatic Cable Fault Locator

The T-906 is an easy to use, portable fault locator for low, medium and high-voltage power cables. It can be applied for the pre-location of all kinds of faults, including open circuit, short circuit, low resistance, high-resistance and flashovers.

The T-906 can operate in four modes: Time Domain Reflectometry (TDR), Secondary/ Multiple Impulse Method, (SIM/MIM), Decay Method and Impulse Current Method (ICM). Most power cable faults exhibit a high resistance, which requires the application of a high voltage surge to break it down for the purpose of pre-location. Of the four modes mentioned, ICM is the most cost-effective method of producing a flashover at the fault point using a standard surge generator. In the T-906, the ICM is augmented by an Automatic Impulse Current (AIC) method, in which waveform recognition techniques are applied to calculate the fault location automatically, without the need for the operator to manually interpret the waveforms. For flashover faults requiring a high breakdown voltage, the Decay Method can be applied in conjunction with a HV DC source. The cable is charged by the DC source until it breaks down, creating a transient voltage signal which is captured through a capacitive voltage divider and used for fault location analysis.

T-305E High Voltage Surge Generator

The T-305E high voltage surge generator, is used for locating high impedance and flashing faults on distribution cables. It works in conjunction with a cable fault locator for pre-locating the fault position and then with a pinpointer to find the precise fault location. It is applicable for different cable fault location techniques, such as the impulse current method (ICM) and the secondary/multiple impulse method (SIM/MIM).

The equipment can deliver up to 32kV with either 1024J or 2048J of energy. It consists of a capacitor bank, an in-built voltage transformer and a rectifier, switchable to achieve different capacitance and voltage levels. When the unit is switched-off, its automatic and manual discharge facilities removes any residual capacitive charge. Additional circuitry blocks the operation of the unit if an effective Earth/Ground connection is not in place.These features, together with safety interlocking, ensure safe, reliable and easy-to-use operation.

The T-305E also provides repetitive discharges pinpointing to facilitate pinpointing through the detection of the magnetic field and audio signals related to the fault discharging.

T-506 Pinpointer

The T-506 is used together with a high voltage surge generator, to pinpoint high resistance and flashover faults on power cables. It utilises an Application (App) running on a Tablet PC or other Android device, connected wirelessly to a hand-held sensor. The HV surge generator injects periodic high voltage surges down the cable which causes flashover at the fault point. The sensor detects magnetic and audio signals emanating from the faulted cable during this process. By following the instructions on the Tablet, the exact location of the fault can be pinpointed

T-300 Cable and Pipe Locator

The T-300 Cable and Pipe Locator consists of a transmitter and a receiver. It can be used to locate the route and depth of underground cables and metallic pipes, thus ensuring that potentially dangerous power cables and other underground utility services can be avoided during groundwork. In addition, it can identify an individual cable from amongst a group to help with connection and fault finding.

T-RM5000 Insulation Resistance Tester

The T-RM5000 insulation resistance tester is used to measure the insulation resistance of power cables, capacitors, transformers and generators etc. It can be set to increase the voltage in 50v steps from 500V to 5000V. The absorption ratio and the polarisation index are automatically calculated and it displays the results together with the capacitance data.

T-1000 Cable Test Van

The T-1000 Cable Test Van system brings together the equipment in the range allowing easy transportation and comfortable operation in an air-conditioned cabin. It is designed to locate cable faults and to pinpoint the fault location. It can also be used for route tracing, cable identification, voltage withstand tests and cable information management. It is suitable for all voltage levels and for all kinds of cable faults, including; open circuit, short circuit, low resistance, high resistance and flashover faults.

T-P23 Low Voltage Transient Fault Locator

The Kehui T-P23 has been designed for locating all types of low voltage cable fault, but especially the difficult and troublesome transient and intermittent fault. It is especially suitable for branched cables. . The unit is installed on a suspect cable at a suitable point (such as a substation, underground link-box or fuse cabinet). It then monitors the live cable, triggering when a new disturbance occurs. The T-P23 has three modes of operation; Time Domain Reflectometry (TDR) where a single unit is used, Travelling Wave (TRS) using simultaneous testing from two units and Voltage Gradient using records from two or more units. The unit can be connected to a suspect cable and can then be controlled locally from a smartphone or tablet PC through its internal Bluetooth transceiver, or remotely over the Internet using its integral GSM/GPRS modem. The resulting signals can be examined in the T-P2X system software to identify the position of the fault.

Distribution Automation

Electrical distribution systems are becoming increasingly complex due to developments such as the increased use of embedded generation. Additionally, regulators put great pressure on the providers to ensure the continuity of supply. This situation results in a need for automation to replace manual control of the system. In the event of a loss of supply, the network must quickly be reconfigured to reconnect as many consumers as possible, a process known as Fault Location, Isolation and Supply Restoration (FLISR). Equipment such as Kehui's PZK range can provide the intelligence to identify the fault and take the necessary action without any human intervention. They can interact peer-to-peer to automate a local network, or as remote terminal units (RTUs) for a wider SCADA system.

Fault detection includes the ability to identify downed conductors which create high-impedance faults, that are extremely dangerous if they cannot be detected and cleared by standard protection. The system is suitable for all types of system earthing including Petersen coil.

PZK-56 Distribution Network Terminal

The PZK-56 features the single CPU Module design that is common to the whole PZK-5x family of RTUs. It is designed for the harsh environmental operating conditions experienced by field-installed intelligent electronic devices (IED). The design is ideal for substation monitoring and control and to work with a variety of power system plant including; switchgear, reclosers, transformers, ring main units, box substations, and reactive power compensation capacitors. It can be provided in a variety of formats including pole-mounting, cubicles and racks. The PZK provides the following features:

- Communication with the main substation in the distribution network, to monitor and control the status of the switch on the overhead line
- Fault location, isolation and supply restoration (FLISR), including low current earth faults
- Local automation without reliance on the master station control
- Distributed protection for; overcurrent, current differential and remote trip anti-islanding
- Islanding unbalanced power control
- Distributed low current ground location and tripping

PZG Intelligent Fault Passage Indication

The PZG series distribution line fault locating system is composed of three acquisition and three acquisition and indication units (one per phase), and a pole-mounted collection unit. The system gives a visible, flashing indication of the passage of fault current, whilst collecting data to locate the fault and Comtrade waveforms for subsequent analysis. This data can then be used for automated fast supply restoration, or can be transmitted to a remote master station for appropriate action to be taken.

The equipment can be powered from a line-mounted VT or from a solar panel. These are backed-up with a super-capacitor and a lithium ion battery to ensure that the equipment continues to operate under all conditions.

Power Utility Products

The transmission line is a key asset in the electrical power network, transporting vast amounts of energy across often considerable distances. The condition of these lines needs to be continuously monitored to ensure their health and reliability. In the event that something does go wrong and a fault occurs it needs to be located and dealt with quickly.

XC-2100E Travelling Wave Fault Location System

When a fault does occur, it can be difficult to locate, particularly on long remote lines. Conventional fault locators work on the principle of measuring the impedance of the loop through which the fault current flows. In most cases, this includes a return path through the ground for which knowledge of the actual impedance is hard to obtain and is often estimated, leading to inaccuracies in the measurement of the distance to the fault. By utilising travelling waves, created when the fault occurs, the XC-2100E can measure the fault position independently of impedance and identify the fault point much more accurately.

The system provides accurate fault location for all transmission and distribution power lines, with each unit monitoring up to 8 lines. The fault distance measurement error is less than ±150m and is independent of line length and other factors which affect the fault location accuracy of traditional impedance measurement methods.

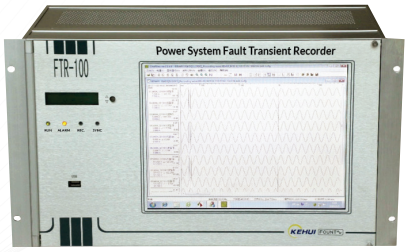
In addition to overhead lines, the system is also suitable for underground and underwater cables, plus hybrid systems mixing overhead lines and cables. The XC-2100E consists of the travelling wave data acquisition unit XC-100E installed at the substation and the master station which analyses the data using software XCF2100E. For accurate timing of the devices involved, the XC-2100E uses an internal GPS time synchronisation module to provide an accurate time reference.

FTR-100 Fault Transient Recording System

Discrete transient recorders remain a vital part of the electrical power system. Even though disturbance recording is an integral part of modern protection based intelligent electronic devices (IEDs), the stand-alone FTR-100 can provide a much more detailed picture without having to piece together the jigsaw of data from other sources, which are often only recorded when the IED reacts to an actual fault condition. With its variety of triggers, the FTR-100 can identify problems on the system even before a fault occurs.

T he FTR-100 power system fault transient recorder is applicable to conventional and digital substations. In a conventional substation, the recorder performs transient, steady state and continuous recording of the AC/DC analogue quantities and digital status from the primary equipment. The unit will store 7 days of data under normal conditions. A wide variety of trigger conditions will allow it to store up to 5.5s of data before and after the trigger event.

The unit also supports the IEC61850 standard, both on the process bus and station bus level. In such digital substations, it monitors, captures and records Sample Values (SV) and GOOSE messages on the process bus, plus MMS messages on the station bus. It checks the integrity of the message for abnormality and performs error-reporting. Through SV and GOOSE messages, it provides monitoring of the analogue quantity and circuit breaker status information within the substation.



T-GPS Series Time Synchronisation Equipment

GPS-3000 is a time synchronisation product that utilises Global Positioning System (GPS) satellite signals, to provide an accurate time reference for the power system.

It combines a GPS receiver with a micro-computer and buffers, to provide a local time source with a variety of outputs. The format of the output signals is configured to match the requirements of all available disturbance recorders, sequence of event recorders, travelling wave fault locators, SCADA systems and other equipment requiring accurate timing.

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