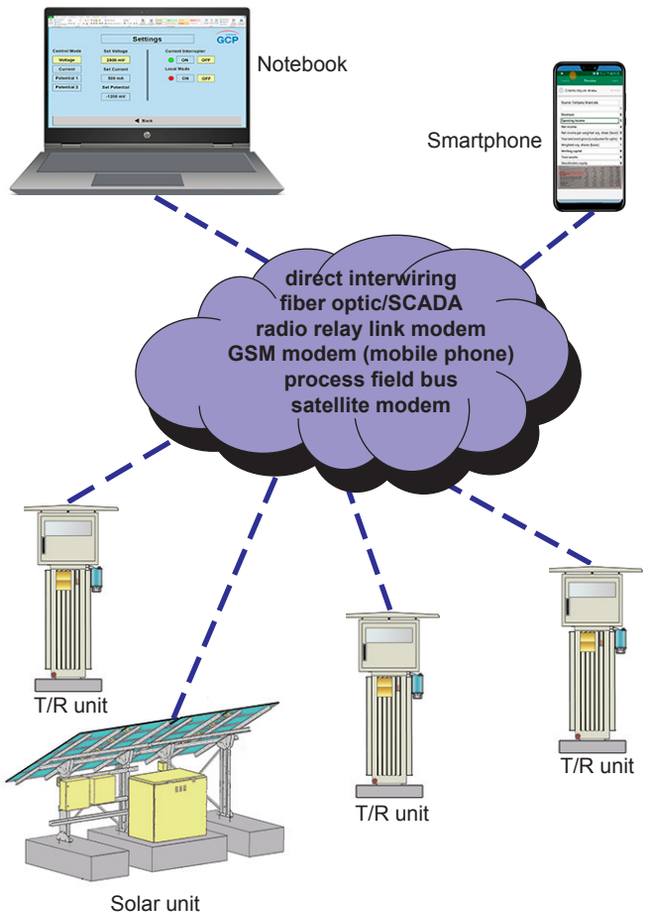
CORROCONTROL-2 replaces our old GCP RMCS system.
Cathodic protection systems can only keep their efficiency if they are inspected and maintained at regular intervals. This is often very costly and time consuming, especially, if the systems are installed in remote areas or in hard-to-reach places.
The remote monitoring and control technique enables supervision of separated cathodic protection systems with the help of global communication technology from any point of the world.

...As if you would be on site and have everything under control!

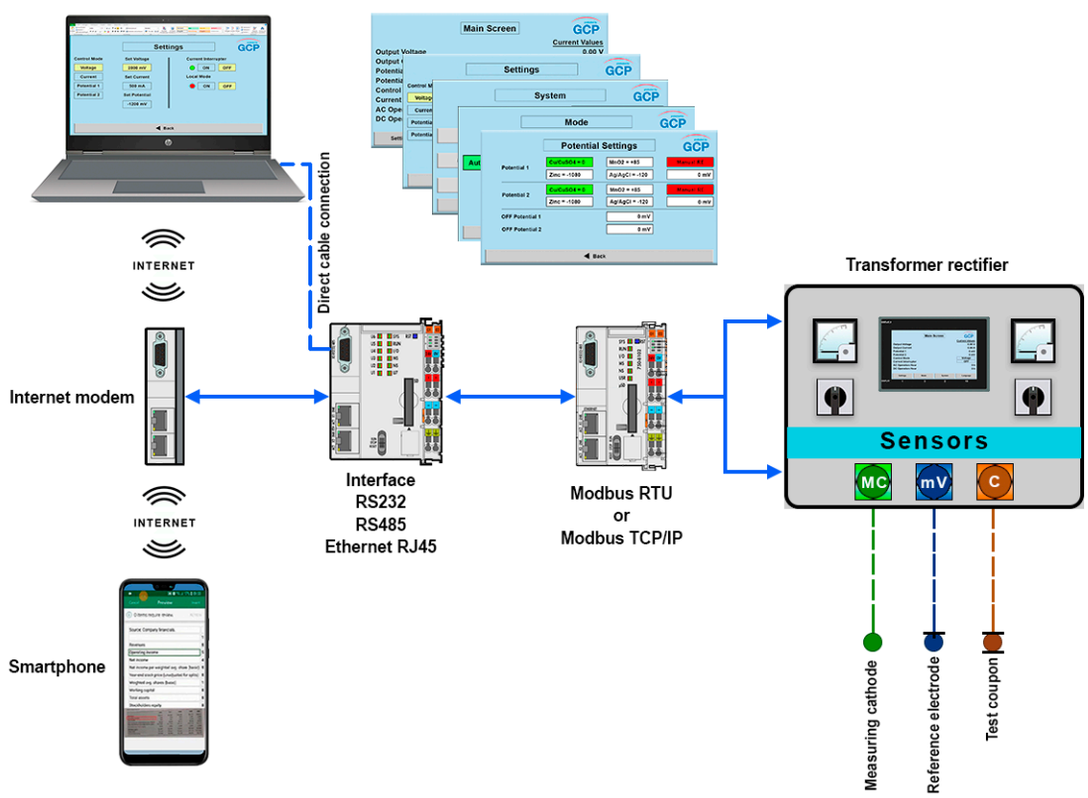
Independend, how far you are away from the location of the cathodic protection stations, it is always ensured that your systems are monitored and controlled.
The fundamental functions of CORROCONTROL-2 can be subdiveded into several subranges, like entering and alarming, switching, controlling and adjusting, as well as long-term archiving of all system relevant operational data of the connected cathodic protection stations.



System layout

There are different possibilities to connect the CORROCONTROL-2 unit to the DC power supply (e.g. Transformer Rectifier, DC/DC converter).

The CORROCONTROL-2 can be installed either inside of the TR-Unit compartment or in a separate housing.



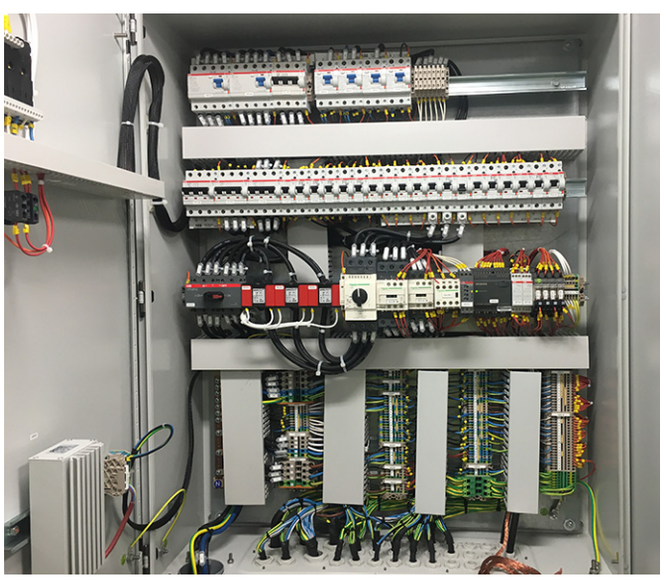
General

CORROCONTROL-2 is a control unit specially designed for the requirements of cathodic protection systems. CORROCONTROL-2 can be used in all different cathodic protection applications such as pipeline protection, well casing protection, plant protection, internal and external protection of tanks, protection of off-shore structures, protection of steel in concrete, etc.

The main application of CORROCONTROL-2 is the monitoring and control of such impressed current systems as Transformer Rectifiers or DC/DC units.

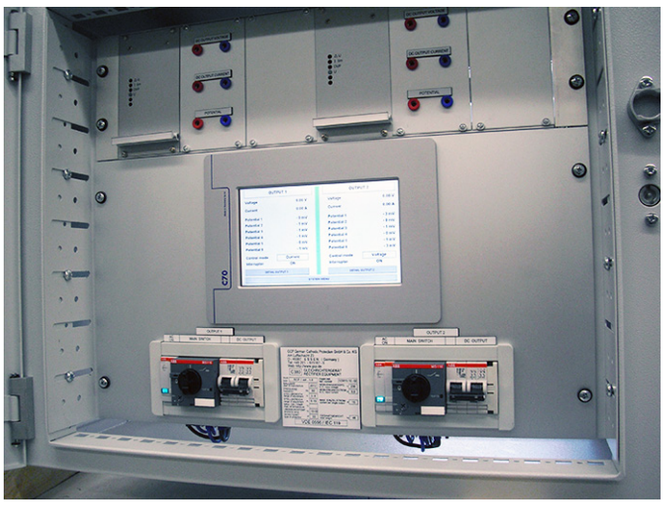
CORROCONTROL-2 can be operated as a stand-alone system with all parameters adjustable using virtual push buttons on the display of controller, or via serial and/or parallel link from a remote desktop computer.

Different CORROCONTROL-2 units can be connected to one single central computer to create a network in order to control every CORROCONTROL-2 unit from one central monitoring and control station.



Basics

CORROCONTROL-2 consists of a 4,3”
Multitouch screen as an operating panel, built into box on the front side, control unit and a terminal plug at the back side.

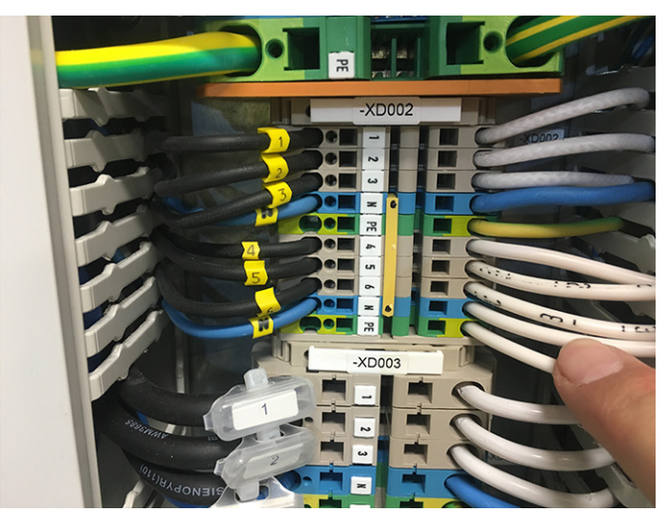


CORROCONTROL-2 can function as
Output Regulator in existing and new impressed current cathodic protection systems.

CORROCONTROL-2 completely
replaces Output Regulator CORROCOTROL, performed in 19”-format and supplied earlier.

CORROCONTROL-2 measures continuously the output voltage and the output current as well as the potential of up to two (2) connected reference electrodes (Cu/CuSO4, Ag/AgCl, Zinc or MnO2).
The output values are controlled respectively to the chosen operation mode:
- constant voltage,
- constant current,
- constant potential.

This helps to avoid both over-protection and under-protection of the structure against corrosion.



Reference electrode
The Reference electrode type of the CP System can be one of the following:

- Cu/CuSO4 (copper-copper sulfate)
- Ag/AgCl (silver-silver chloride)
- Zinc (zinc)
- MnO2 (manganese oxide)

A second Reference electrode (option) can be connected to the CP System.

The type of connected reference electrode can be selected in the “Potential Settings” of menu “System” of the CORROCONTROL-2 unit in order to display the potential value in respect to Cu/CuSO4 electrode. This means that when using a Zinc, Ag/AgCl or MnO2 electrode, the potential value displayed will be automatically converted to the equivalent Cu/CuSO4 value.

Cathode connection
We strongly recommend using a separate cathode measuring cable linked to the cathode instead of using a bridge to the main cathode cable since this will avoid misreading of the potential value caused by the voltage drop over the main cathode cable.

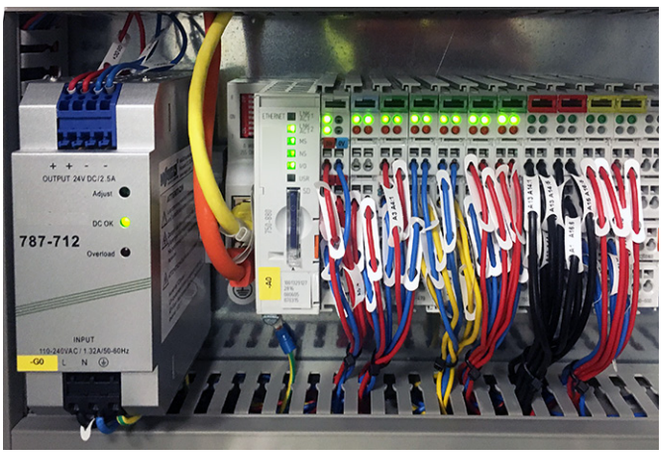
ON/OFF Relay for current interrupter mode
A changer relay contact is available for switching of a current of 2 A. Higher currents can be switched indirectly using external equipment.
The default time cycle is 12 s ON and 3 s OFF as standard.
If necessary, the time cycle can be changed in the “ON / OFF Time Settings” menu.

When selecting current interrupter mode, the relay is active for 3 s and remains inactive for 12 s. While current interrupter mode is activated, the output current and the output voltage cannot be controlled. Control and adjustment is possible again when the current interrupter mode is deactivated.

RS232 / RS485 / Ethernet interface
Optional RS232/RS485/Ethernet are available for the purpose of monitoring and control of the TR-unit via a connected (directly or via network) computer or PDA with an optional software.
Type of the network is to be agreed in advance.

Network topology for the connection of CORROCONTROL-2 units:

RS232	– 32 pcs;
RS485	– 32 pcs;
Ethernet	– 65.000 pcs.



Functions
CORROCONTROL-2 contains special functions for the control and monitoring of cathodic protection stations.
The operating parameters (“outputs”) can be modified using the multi-touch control panel.

CONSTANT VOLTAGE MODE
automatically maintains the DC output voltage at a set value. The set value can be continuously adjusted between zero and maximum rating.

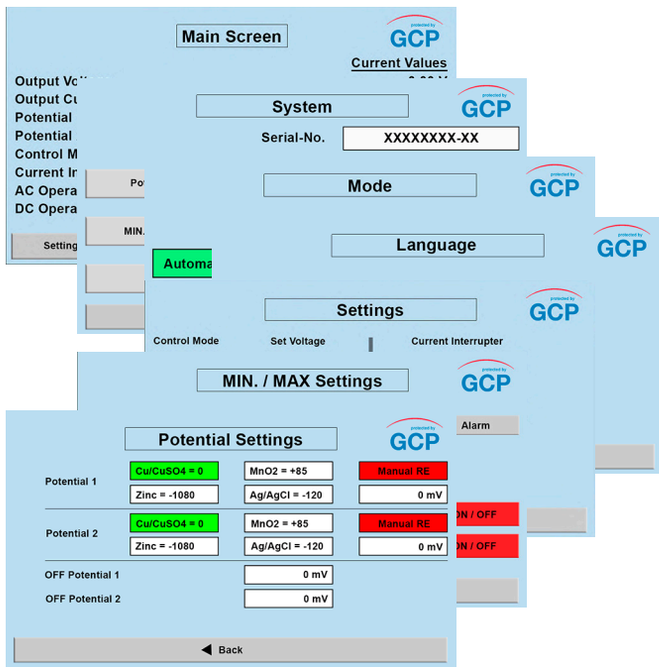
CONSTANT CURRENT MODE
automatically maintains the DC output current at a set value. The set value can be continuously adjusted between zero and maximum rating.

CONSTANT POTENTIAL MODE
automatically maintains the constant output potential at a set value. The set value can be continuously adjusted between zero and maximum rating.

CURRENT INTERRUPTER MODE
In this mode, the outputs continue to operate in either constant voltage or constant current mode, but operation is interrupted according to the “ON / OFF Time Settings”. When current interrupter mode is selected, the corresponding status will be shown in Displays.

DELTA “U” MODE
DELTA “U” MODE can only be used, if two reference electrodes are connected. If set to this control mode, both electrodes are used for output control. The output is controlled according to the more negative of the two electrode values. Therefore, the potential will be controlled and kept constant at the given set point. The potential will be limited by the current limits (MIN & MAX values).

Display Screens and Menus which are used to operate, control and monitor the outputs. Each output has a touchscreen button which can pressed to select the controls and functions required. Settings are also modified using touchscreen buttons.

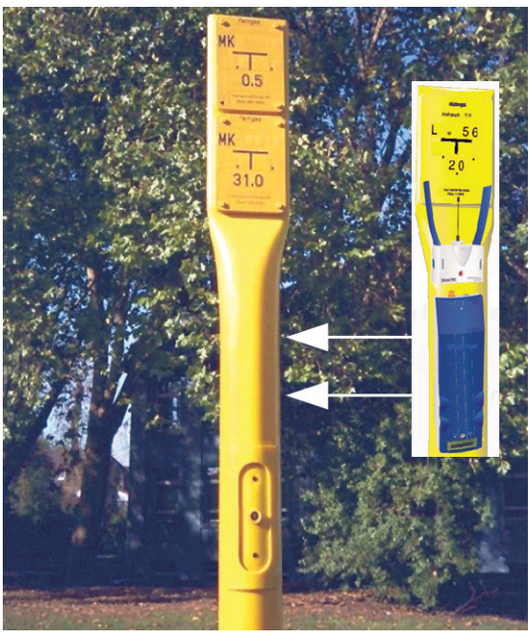


Specifications

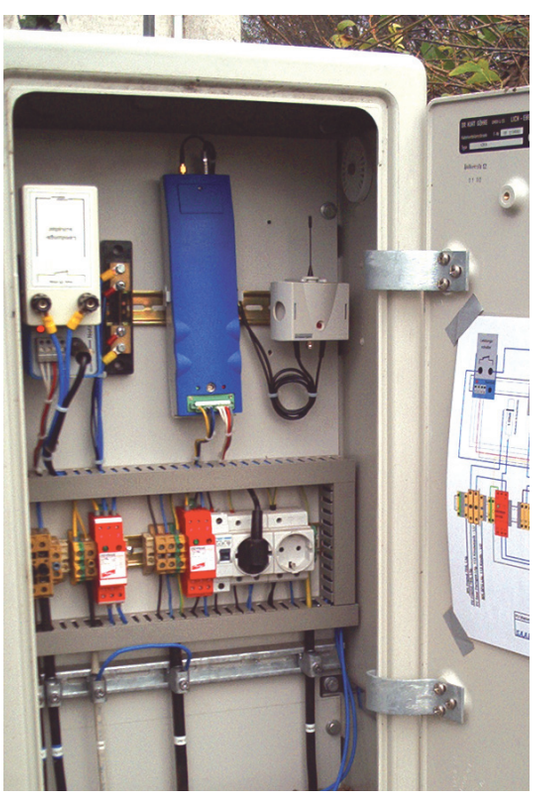
AC Input	115 - 230 V, 50/60 Hz
DC Input	19 - 48 V DC
Power	< 5.0 W
Potential Measurements (2 electrodes)	(-9 V) – (+9 V) DC, >1 MΩ
Shunt Measurements	0 – 60 mV, 1 MΩ
Voltage Measurement	0 – 100V, 120 kΩ
Output, Control Signal (Ust)	0 – 5V DC or 0 – 10V DC
Output, Potential Meter	(-9V) – (+9V) DC
Relay contact for current interrupt mode	2A DC, 2A AC
RS232 / RS485 Mark Condition	-8V DC (approx.)
RS232 / RS485 Space Condition	+8V DC (approx.)
RS232 / RS485 Baud Rate	9600 bit/s
RS232 / RS485 Protocol	8E1
RS232 / RS485 Handshake	None
RS232 Max. Cable Length	10 m
LCD Display Definition	480 x 272
LCD Display Text size	8-12 (Arial)
Dimensions	190 x 150 x 130mm
Weight	approx. 1.50 kg
Operation Temperature	-10 °C to +60 °C

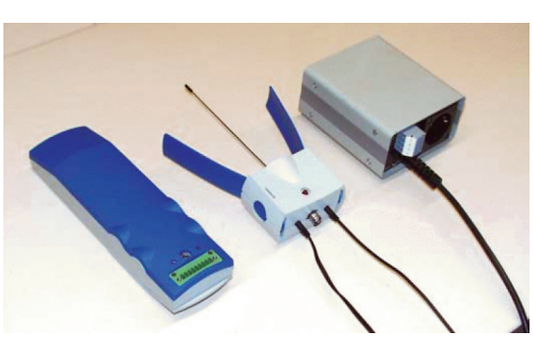
German Cathodic Protection

Mains-independent Remote Test Point Monitoring



Remote monitoring of cathodic protection systems is only economically feasible if installed at test points and rectifier stations, too, thus reducing amount of time and labour otherwise required for regular manual monitoring of test points and rectifier stations.
MiniTrans has been specially designed for automated wireless remote monitoring of cathodic protection systems to monitor such values like on- and off-potentials, AC voltages, currents and microvolts.
Introduction of low-energy hardware and latest GSM radio technology allows 3 years of daily measurements and monitoring operations without battery change.
Depending on the frequency of connections a transmission rate of monthly 50 - 500 MB will arise.





Combined system consisting of sensor, antenna combination and external power supply unit

Mains-Supplied Remote Monitoring of Rectifier Systems

Trouble-free and reliable operation of cathodic protection systems depended hitherto on regular and manual supervision of functions and monitoring of rectifier voltages and rectifier currents of cathodic protection stations.
By introducing MiniTrans remote monitoring of protection systems, manual maintenance will be reduced to a minimum.
Mains-supplied and wireless-operated MiniTrans monitors and controls rectifier voltages and currents, as well as on- and off-potentials of your cathodic protection system.
Rapid detection of a breakdown of protection systems as well as rectifier problems even in cases of mains failures is being ensured by MiniTrans remote monitoring system built-in back-up battery.

Switching of Rectifiers for Maintenance and Intensive Measurements

The installation of MiniTrans wireless sensors in rectifiers stations eliminates the hitherto time-consuming, but indispensable temporary installation of timer switches, required for maintenance and intensive measurements.
Activation of rectifier switching as well as selection of switching cycles of single or groups of rectifier stations may be carried out completely office-remote controlled or by mobile team.

Multi-Channel Data Logger for remote controlled Registration

Over and above remote monitoring, MiniTrans allows remote controlled multi-channel registration.
MiniTrans thus offers indispensable functions to support measurement of stray currents and fault location.

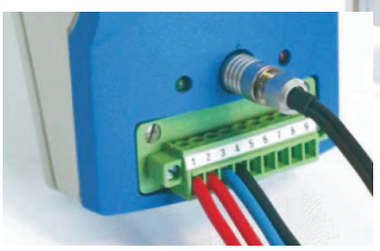
Low Cost Installation and Setup

Already during installation at test points, MiniTrans constitutes a simple and cost-saving solution.

The antenna combination specially designed for combined use of DCF-77 radio time and mobile phone purposes, will simply have to be slipped into the test point pole while wireless sensor will be mounted on top of the terminal board.

Incorporating a test point into remote monitoring network requires no more than wiring of input channels, followed by short test of functions.

DCF-77 and GSM antenna terminal



Input channels and serial PC interface port

Controlling rectifier stations by mobile phone

Time and Cost Saving Remote Programming

Due to comprehensive remote programming facilities of measuring and radio transmission parameters, MiniTrans allows the technician-operator to control all functions right from the office, eliminating otherwise necessary time- and cost-intensive site travels.

MiniTrans thus allows quick and trouble-free reaction to changes of operational conditions of cathodic protection, such as measuring periods and volume.

In addition to standard requirements of CP measuring technique, MiniTrans continuously supervises and transmits internal data such as battery condition, DCF-77 and GSM signal strength, ambient temperature and state of synchronisation.

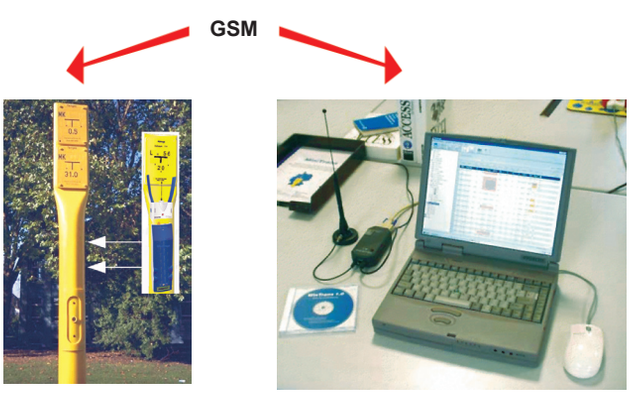
Mobile Remote Control of Rectifiers by Mobil Phone MiniTrans wireless sensors are serially fitted for remote functions via SMS-data. This allows the use of any SMS-capable mobile phone to activate different switching modes and cycles anytime, anywhere by means of simple key functions.

Intelligent and site-independent Remote Monitoring

Intelligent utilisation of latest GSM radio technology allows the use of MiniTrans remote monitoring system locally and abroad including protection against data loss or multilation.

During automatic data backing-up and transmission by means of GSM mailbox, each MiniTrans wireless sensor auto-secures its remote monitoring functions without the office PC to be in activated state.

Simultaneous reception of measuring data and control of remote monitoring functions by up to 3 offices or mobile supervisory teams is being supported thus allowing to run the entire remote monitoring system without having to operate from fixed office station.

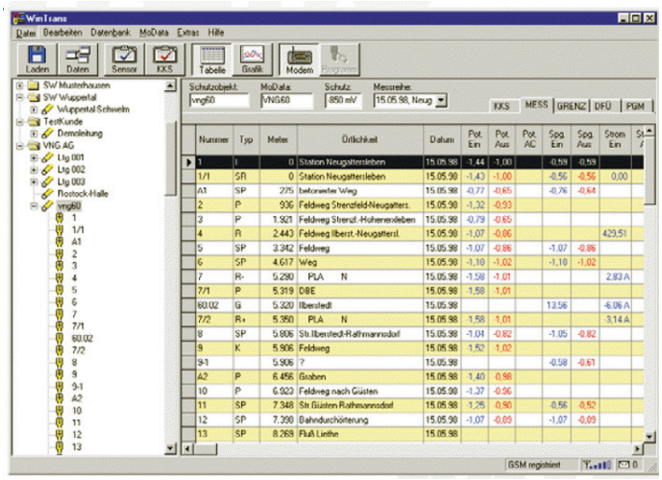


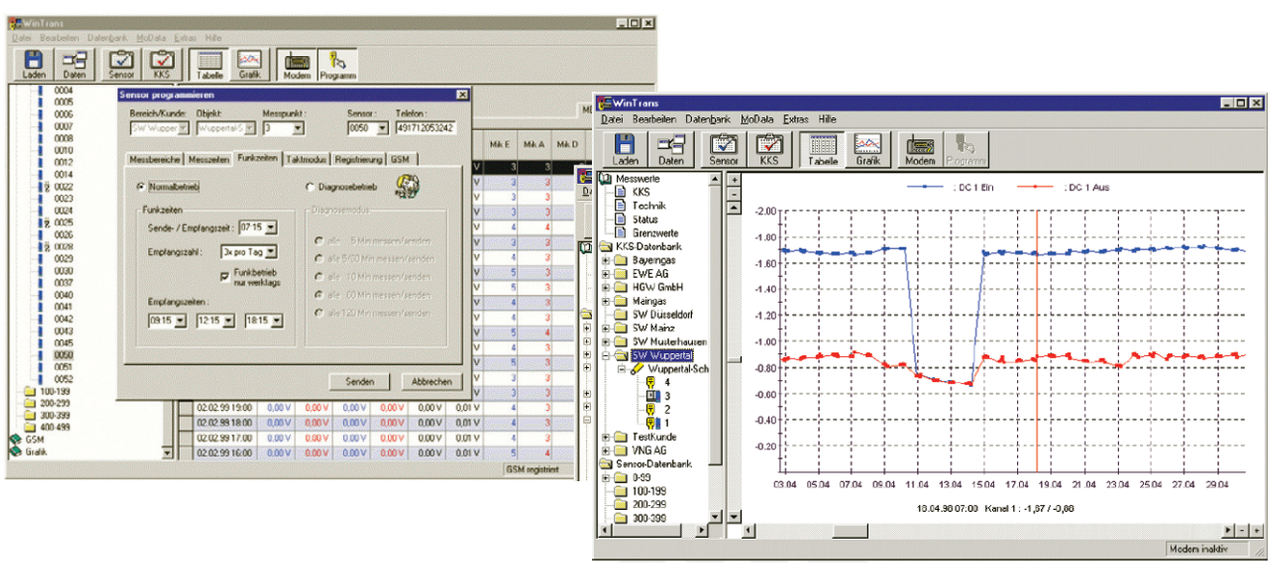
WinTrans Software for Control and Evaluation of Remote Monitoring and Maintenance

The entire control and evaluation of MiniTrans wireless sensors is being effected by WinTrans software.

All parameters of current remote monitoring operations, like measuring ranges, measuring periods, radio transmission and switching cycles are being administrated by WinTrans and radioed to MiniTrans wireless sensors.

By means of a comprehensive and powerful database, optimally programmed to suit the monitoring require-ments of your cathodic protection system as well as those of your customers, WinTrans administers control and care of your entire CP test points and rectifier stations.





Intelligent Remote Monitoring within Network

The aim to achieve intelligent and maintenance-free use of this remote monitoring system by consequent reduction of numbers of components, was also pursued in the design of the office equipment.

Reliable control and evaluation of test point and rectifier stations out of your office is being enabled by means of WinTrans radio modem, external radio antenna, as well as PC / Notebook-installed software WinTrans.

Linked with a network, all information regarding test points and rectifier stations of your entire organisation are handy at your fingertips.

German Cathodic Protection

Technical Data

Description	Battery operated wireless sensor for radio-controlled monitoring and registration of CP-measuring data and for remote controlled switching of rectifier station
Measuring Inputs	2 x DC (with high AC attenuation) 2 x AC (parallel to DC channel measuring) 1 x µV (with high AC attenuation)
Memory	32 KByte Program / 96 KByte Data
Interface	9600 Baud serial for programming and supervision on installation site
Timer	DCF-77synchronised real time clock with supply voltage change-over and active temperature compensation
Timer Deviation	50 ms max. at 12 DCF receiver sequences / day (between -20°C and 60°C)
Switching Load Output	30 V / 0.1 A / 30 (higher load with external power supply unit)
Wireless system	Internal radio modem for GSM networks at 900 MHz
Antenna	Special antenna combination for DCF and GSM-radio application for test point mounting or rectifier station installation
Program Updates	Wireless via remote transmission or direct via serial interface
Calibration control QM	Via serial interface with notebook on site
Battery Power Supply	Lithium battery pack 7,2 V / 13 Ah (uninterrupted data safety during battery change)
Mains Power Supply (optional)	External power supply unit with slave relais control
Dimensions / Weight	
Wireless sensor	65 x 240 x 40 mm (W x H x D) / 480 g (incl. Battery)
Antenna	75 x 60 x 40 mm (W x H x D) / 170 g (excl. Antenna rod)

Measuring Ranges

DC Voltage		Channel 1 + 2
	Range ± 1000 mV ± 10 V ± 150 V	Resolution 0.1 mV 1 mV 15 V
Input Impedance	> 2 MΩ	
Damping at 16.6 Hz at 50.0 Hz	60 dB (factor 1.000) 100 dB (factor 100.000)	
AC Voltage		Channel 1 + 2
	Range 1 V eff. 10 V eff. 250 V eff.	Resolution 0.2 mV 2 mV 50 V
Input Impedance	> 2 MΩ	
Frequency range	15 - 500 Hz	
Microvolts		Channel 3
	Range ± 100 mV	Resolution 1 µV
Input Impedance	> 200 kΩ	
Damping at 16.6 Hz at 50.0 Hz	60 dB (factor 1.000) 100 dB (factor 100.000)	
Zero calibration	Automatic before measu-rement	

Remote Monitoring / Switching of Rectifier Station

Monitoring facilities	2 DC channels On / Off (e.g. potential and protection tube) 2 AC channels (e.g. potential and foreign pipe) 1 µV channel On / Off (e.g. pipe current or rectifier current)
Measuring periods Mode normal Mode diagnosis	Max. 4 complete on- and off measurements / day (timer free programmable) 5, 10, 30, 60 or 120 min
Formation of mean value	Freely programmable (without or 1, 2, 4 or 8 min)
Switching options Permanent On Measuring Cycle Permanent Cycle Permanent Off	e.g. in case of interface measurements Standard setting at remote monitoring e.g. 12/3 or 4/2 for intensive measurement For pipe repair
Radio periods Mode normal Mode diagnosis	Max. 4 complete on- and off measurements / day (timer free programmable) Every 5, 10, 30, 60, or 120 min
Status monitoring DCF-77 Signal Synchronisation Radio signal Battery state Main power supply Temperature Zero calibration	Quality and reception successes Timer deviation in ms Quality and reception successes Remaining capacity and operational time Mains failure indicator Temperature measurements Monitoring measurements accuracy
Remote programming	All settings and measuring features are completely remote programmable
Battery life span Mode normal Radio on weekends off	Approx. 2.5 to 3 years Approx. 3.5 to 4 years

Registration / Data Logger

Channels	2 DC, 2 AC, 1 Microvolts
Sampling Rate without microvolts measurements with microvolts measurements	0,5 s, 1 s, 2 s, 5 s, 10 s, 30 s 2 s, 5 s, 10 s, 30 s
Measuring values memory	ca. 50.000 values
Programing	Number of channels Measuring range Sampling rate Start-up Terminal time
Data Transmission	Wireless by radio or direct via serial interface
Remote Programming	all features remote programmable
Battery Life Span	Approx. 80 single channel recordings at 1s sampling rate over 6 h (incl. radio transmission)
Zero calibration	Automatic during registration

MiniTrans Plus Remote Monitoring for CP

With the experience gained in the last 20 years by having installed more than 11,000 MiniTrans (MT) in rectifiers and 4,000 in test points, the MiniTransPlus (MTP) with its integrated rectifier control moves remote monitoring for cathodic protection up to a new level.

Rectifier Control
30A Relay Built-in
Coupon Measurement
Battery Life up to 5Y
Threat Detection (Patent OGE)

GSM transmission
GPS time synchronisation

Touch Display and Parametrization by Smartphone
The integrated touch display informs about all measurements and settings.
The parametrization on-site is done by smartphone and a webApp.
The galvanic isolated USB interface allows important system settings by PC/Notebook without smartphone.

4 DC and 4 AC Inputs
30A relay for switching
rectifier regulation

4 Inputs with 8 Channel Measurement (DC and AC)
Beside the 3 inputs well known for the old MT, the new MTP got an additional 4th input with a separate GND.
This way the MTP got inputs for 2x voltages (DC+AC), 1x microvolt (DC+AC) and 1x additional voltage / microvolt value (DC+AC) galvanically isolated, resulting in 8 channels altogether.

Built-in Calibration Cell
On a daily base MTP calibrates itself automatically for factor and´offset with an internal 10V and 10mV calibration cell and 0.1% accuracy. Inputs being out of tolerance or defect are detected by this procedure without the need for manual, external calibration.

On / Off Measurements and Data Logging combined
As with the old MT, the new MTP measures a few On and Off values on user defined times per day. In addition and automatically all 8 channels are being sampled every second and stored in a ring buffer for daily transmission to the WinTrans 2.0 server in a WinLog 2.0 data logger file format. This way 24/7 data logging with 1s is provided for each MTP installed.

Coupon Measurement with Internal Relay and Shunt
MTP integrates the same 1ms Coupon measurement as known from the MiniLog2 with Minicoup. The On and Off potential of the coupon, as well as the coupon DC and AC current are measured. Additional to the numeric values, every 5min a 1KHz oscilloscope picture showing the off phase after the switching is transmitted to the WinTrans 2.0 server for evaluation by the user.

GPS Time Synchronization and Coordinates
The built-in GPS receiver synchronizes with 1ms accuracy and also the GPS coordinates are transferred to the WinTrans 2.0 server. Not only On and/ Off potentials are measured synchronized, but coupon measurements on all test points.

Rectifier Control in real time with Smartphone
MTP not only switches the rectifier by the MTP internal 30A / 90V electronic relay for measuring On and Off values, but controls and regulates the output voltage or current by Pulse Wide Modulation (PWM).
MTP migrates any existing, non-regulated transformer rectifier into a modern, potential or current regulated rectifier with remote control by Smartphone or WinTrans 2.0 server.

PipeMon+ (Threat Detection Patent OGE)
In combination with the high resolution of 0.1 µV for the microvolt channel and 10 samples/s with real time transmission to the WinTrans 2.0 server, the MTP does threat detection with the PipeMon+ OGE system.

WinTrans 2.0 Server Software
The evaluation of all the data from MT and MTP as well as the rectifier control is done with the internet and/or intranet based WinTrans 2.0 software.

Technical Data
Remote Monitoring and Remote Control
for CP Rectifiers and Test Posts
with TFT Touch Display, UMTS, GPS, RS232, Bluetooth, galvanic isolated USB and Ethernet (optional)

Channels

2x DC + 2x AC	with common ground
1x DC Mic + 1x AC Mic	with common ground
1x DC + 1x AC	galvanically isolated

Self-testing and calibration of factor and offset with a built-in and 0.1% accuracy reference cell for 10mV and 10V on all inputs.

Range, Resolution and Impedance

Mik:	± 10 mV / 0.1 µV	200 K? (DC + AC)
Mik	+ CH4: ± 100 mV / 1.0 µV	200 K? (DC + AC)
CH1, 2 and 4: ± 100 V / 0.1 mV		10 M? (DC + AC)

Measuring Times (for 8 channel ON and OFF sampling)
Normal Mode: 4 user defined times
Diagnose Mode: every 5, 10, 60 or 120 min

Sampling Rates (Data Logging with Min, Max and Median)
1 channel: 1000/s (= 1 KHz)
1 - 4 channels: 10/s, 1s

Low Pass Filters and Damping
16 Hz > 60 dB = Factor 1,000
50 Hz > 100 dB = Factor 100,000

Internal Ring Buffer
4 MByte = 2 days with 1s and 4 channels

SD Card Ring Buffer (used in case of internal ring buffer overflow)
8GByte = 10 years with 1s and 4 channels

Input and Output Contacts
One galvanically isolated input and output each
(i.e. input for door contact and output for alarm contact)

Time Synchronization
Built-in GPS receiver (for an external GPS antenna)

Time Deviation
± 5ms/1h with hourly GPS reception ± 100ms/24h with no GPS

Remotely Controlled Switching Cycles
Resolution 100ms, freely user defined (i.e. 0.8s ON / 0.2s OFF)
User selectable night saving mode

Switching Power
Build in electronic relay with 30 A / 90 V

Coupon measurement
E-On, E-Off, I-DC, I-AC switched via build in coupon relay
Delay time remotely selectable from 1ms to 200ms after switching

Rectifier control and regulation (via patented PWM)
With internal 30A or external 100A relay
Allows standard rectifiers to be remotely regulated (voltage / current)

Battery and Life time with Internal Battery at Test Points

3,6V	5 years: 4x sampling / d 1x transmit / week	
19Ah	3 years: 4x sampling / d 1x transmit / d	60min data logging
	2 years: 4x sampling / d 1x transmit / d	5min data logging

For all: double life time with additional external battery

External Power Supply / Solar Power
DIN rail supply 3.8V / 3A or wall plug transformer, 3.8V / 3A
DC/DC transformer 12V / 3.3V or Kettner solar test post 3.3V / 3A

Housing, Dimension and Weight
IP67 for SIM Card and Measurement, 300 x 70 x 38 mm 580 g