

PIPELINE PROTECTION PROTECTIVE DEVICES FOR AC APPLICATION

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It was in 1986 that an ac-caused corrosion on an underground pipeline in Germany was detected for the first time. One year later the same phenomenon was found in Switzerland. Consequently, this corrosion phenomenon has triggered many research activities. Generally, every pipeline which runs parallel to high-voltage overhead lines and ac railways is at risk of ac-caused corrosion. To prevent this corrosion, cathodic corrosion protection systems (CCPS) are applied.

Leutron now offers an innovative complete solution to protect the CCPS of pipelines against negative influences of lightning currents.



TOTAL PACKAGE FOR PIPELINE PROTECTION

In order to protect CCP systems against the effects of lightning strokes and overloads by induced ac currents it is necessary to provide an effective protection. This is possible by installing a PP BCD TNS 25/100 at the ac power supply side of the CCPS and an EnerPro 65V/12A-Tr plus a DataPro2x1-RLC/50V-Tr on the dc side.

The pipeline has to be divided into sections by applying insulating flanges (joints) or insulating parts at pipelines with a narrow diameter. These sections limit the range of influence of the CCPS.

In case of a lightning stroke to the area, the insulating flange has to be bridged to prevent a potential difference that may result in an electrical flashover and, thus, damage to the inside or outside pipeline insulation. This equipotential bonding is achieved by applying special lightning current resistant, hermetically sealed high-performance isolating spark gaps (100 kA, 10/350 μ s) filled with rare gas. Their fail-safe behaviour impedes mechanical damage at overloads.

Pipelines that transport hazardous mediums like natural gas and run in a duct above or below ground have to be protected with ATEX-certified spark gaps with a low sparkover voltage (70 V ac / 100 V dc) (4) and fail-safe function. In case of direct-buried pipelines no ATEX certification of the isolation spark gap is necessary. Hence, the waterproof isolation spark gap SGO 70/100 QA is the preferred choice.

Due to the bridged insulating flanges the pipeline, at a lightning stroke, acts like an earthing conductor. At certain distances an earthing point has to be set up, either at a pumping station or between them. In the latter case two isolation spark gaps are mandatory at the insulating flange, as mentioned above (5).

If the pipeline runs in parallel with overhead lines or ac cable systems, alternating currents are induced in the pipeline impeding the proper function of the CCPS and causing ac cathodic corrosion. The ac current diverter PLPro 40A-IV pre-

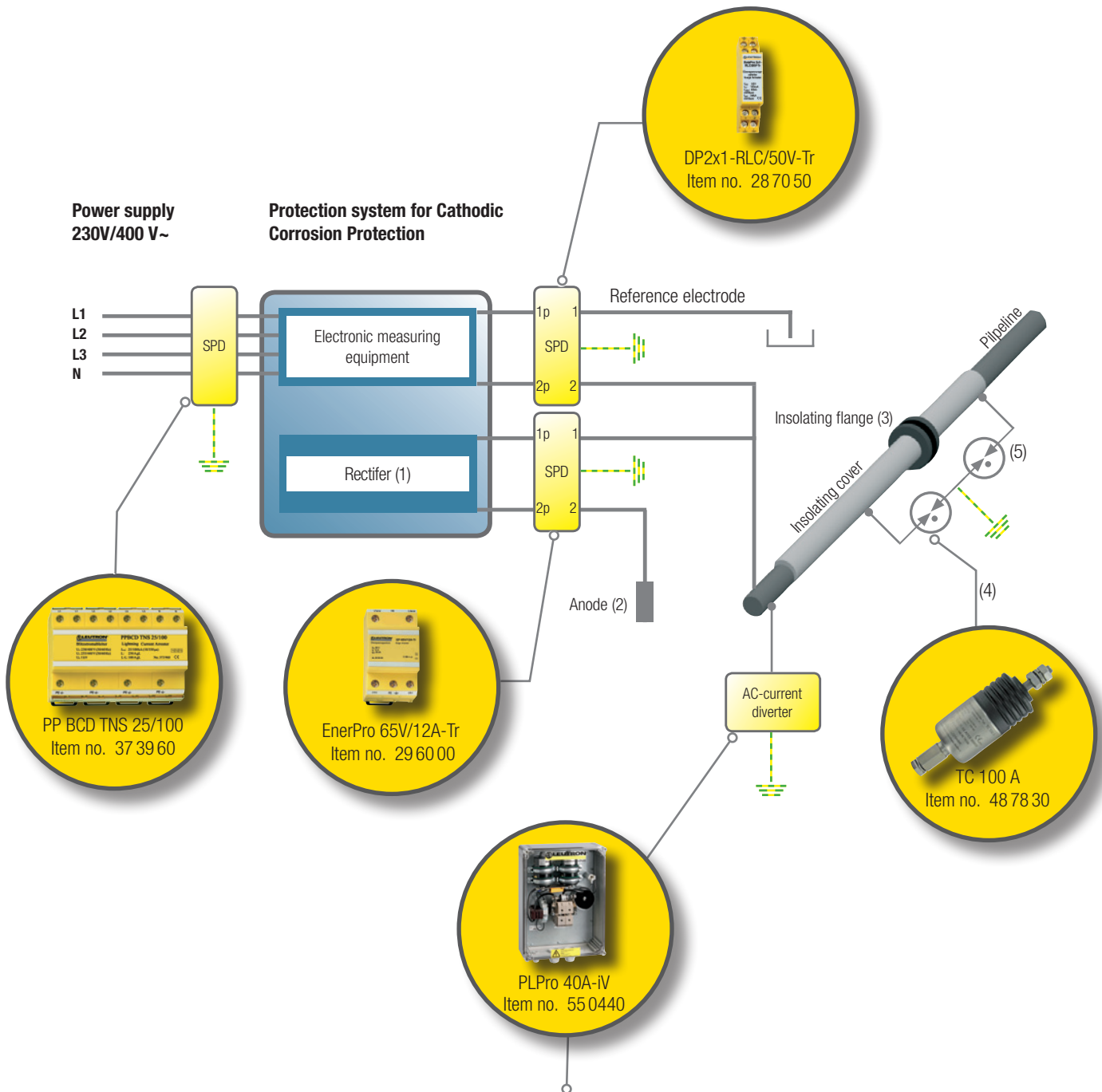
vents this by diverting the induced alternating currents to ground while blocking the direct currents of the CCPS. Therefore, the CCPS continues to stay in effect.

The PLPro 40A-IV is effectively and steadily protected against direct lightning strokes by an isolation spark gap TSF 100 (or TC 100 A in hazardous areas) with 100 kA (10/350 μ s). An integrated current transformer measures the diverted alternating current. An HF filter, included as well, ensures an efficient operation and blocks the 10 kHz detection signal of HF leakage detectors. The amply dimensioned long-life power capacitors are additionally protected by fine-protection diodes.

Buried natural gas pipelines as well as drinking-water pipeline are protected with CCP systems.

Leutron makes sure that cathodic corrosion protection systems work properly and, thus, corrosion is given no chance.





Properties of PLPro:

- Integrated lightning and surge current protection up to 100 kA (10/350 μ s)
- High impulse discharge current
- Safety switch for discharging the capacitors
- Does not have to be disconnected during leakage detection with HF detector (10 kHz)
- Can be mounted in a weather-proof outdoor cabinet or box without further protection measures
- Built-in measuring circuit with analogue display for ac discharge current
- No danger for operating personnel
- Maintenance-free

In general, PLPro consists of five components:

- AC discharge unit, consisting of high-performance capacities (2 pieces per 40 A)
- Surge protection device (fine protection) for the capacitors
- Measurement of the discharge current 100/1 A, AC current transformer, indicating instrument (on request)
- 10 kHz band-elimination filter which prevents the diversion of the 10 kHz search frequency of the leakage detectors against earth
- Lightning protection (coarse protection) by rare-gas-filled isolating spark gap 100 kA (10/350 μ s) with low sparkover voltage



PROTECTIVE DEVICES FOR AC APPLICATION (PIPELINES)

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