An important aspect of the power supply for railways is the control of fluctuations in the distribution network in the case of heavy or light rail traffic. IETV Elektrotechnik AB and the Swedish Transport Agency have developed a new digital control system for the power supply network using Beckhoff technology, which makes control times in the millisecond range possible.

EtherCAT-based power measurement terminal enables high-precision current control
A total of 20 converter substations have now been modernized and converted to EtherCAT technology. The heart of such a station is formed by a Beckhoff Industrial PC (IPC) running TwinCAT automation software, which in this case is used with a Windows CE operating system. “In addition to the actual control software, TwinCAT offers many other features. TwinCAT Scope, a software oscilloscope, displays the fluctuations of the measured data graphically on the Panel PC, and is a very useful auxiliary tool for us,” stresses Lars Christoffersson.

**Power measurement terminals solve interface problem**

“Using the Beckhoff power measurement terminal we solved the interface problem between high voltage values and control values, among other things,” says Lars Christoffersson. An interface unit directly monitors the AC mains network and the railway power network without having to guide the signals through external converter boxes. The power measurement terminal monitors: current, voltage, power, energy, cos \( \phi \), peak values of U, I and P, and frequencies. The information is transferred via an EK1100 EtherCAT Bus Coupler to the controller, where the data are available for further processing.

**Integrated control platform saves components and space in the control cabinet**

The advantage of the solution jointly developed by the IETV and the Swedish Transport Agency is that several functions can be combined on one hardware device. That saves components on one hand, and on the other engineering is simplified thanks to the common hardware and software platform. “Through the digitization of the field current controller, everything is now basically software-based. That offers us completely new possibilities: we are much more flexible than before, especially if we want to try something new or make a change,” explains Lars Christoffersson, explaining the advantages of the new control system: “With PC control we have a modular and expandable platform at our disposal. Perhaps the best thing about it is that the customer ends up with a high performance, compact solution.”