

Bus Terminals for high-precision control processes

→ New analog input Bus Terminals extend the range of applications for the Beckhoff I/O system to the area of high-precision measurement technology. Bus Terminals with minimum measurement error are available for resistor bridges for strain gauge sensors and all common analog input signals.

Due to the high processor power available, PC-based control technology is ideally suited for measurement technology. The „standard“ components from the Beckhoff automation kit can be used to deal with a wide range of measurement and control tasks. The new analog input terminals for high-precision control processes were specially developed for measurement applications.

For applications involving acquisition of forces and pressures or weighing, the KL3356 is suitable for resistance bridge evaluation, e.g. for strain gauges. This analog input terminal has a minimum measurement error of $\pm 0.01\%$ of the full scale value.

Further measurement Bus Terminals process standardized voltage and current signals in the following ranges: $\pm 2\text{ V}$, $0\dots 2\text{ V}$, $\pm 10\text{ V}$, $0\dots 10\text{ V}$ and $0\dots 20\text{ mA}$ and $4\dots 20\text{ mA}$. The signals are digitized with a resolution of 16 bits and a precision of 15 bits, and transported (electrically isolated) to the higher-level controller. The Bus Terminals combine two channels in a single housing. The input channels of the Bus Terminal have differential inputs and possess a common, internal ground potential. Due to their small measurement error of $\pm 0.05\%$ of the full scale value, these terminals are ideally suited for monitor-

ing and controlling important process parameters such as weighing, dosing, quality assurance, or general monitoring of limit values.

High precision and outstanding long-term stability of the measurement Bus Terminals are achieved through self-calibration. The complete circuit calibrates itself at least every 3 minutes. This procedure can be synchronized by the control in order to prevent the calibration leading to a delay in the production process.

Moreover, the accuracy of the measured values is monitored permanently. A warning signal is issued in the event of a violation of the accuracy class, so that “safe” measured data are ensured.



Application example: The contents of a 10-tonne silo are weighed via strain gauges and analyzed via the high-precision KL3356 resistance bridge Bus Terminal. With a minimum measurement error of $<\pm 0.01\%$, the total measurement error is $<\pm 1\text{ kg}$.

The procedure for safeguarding the precision and function control was developed in consultation with “Physikalisch-Technische Bundesanstalt” in Germany. In practice, the KL3356 for direct connection of resistance bridges can be calibrated together with the sensor.

Overview of measurement technology terminals:

KL3132:	$\pm 10\text{ V}$
KL3162:	$0\dots 10\text{ V}$
KL3172:	$0 \dots 2\text{ V}$
KL3182:	$\pm 2\text{ V}$
KL3142:	$0 \dots 20\text{ mA}$
KL3152:	$4 \dots 20\text{ mA}$
KL3356:	resistance bridge evaluation