Tank Weighing Automation
## Efficient Inventory Management

Accurate Inventory Control

Weighing is a very accurate method for monitoring tank inventory. Because it is a contact-free method, it is not impacted by material type or vessel shape. IND360 offers a reliable, preprogrammed inventory control application to accelerate installation and eliminate programming costs.

Clear Process Visibility

IND360 offers instant visibility to process status and inventory levels. The bright display provides immediate visualization for walk-by status and facilitates easy calibration. LoadAdvisor™ guides you through the tank setup quickly.
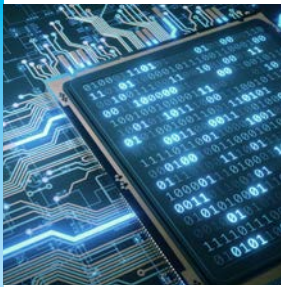
Simplify Integration

IND360 utilizes certified automation interfaces and includes drivers like EDS, GSD and GSDML for fast, failure-free startup. In addition, the indicator comes with a Rockwell AOP, AOI, sample code and Siemens function blocks.

Boost Machine Performance

With ultra-fast processing connected to the world's most widely-used PLCs and DCSs, the IND360 automation indicator boosts productivity while increasing uptime. Center of gravity, condition monitoring and Smart5™ alarming ensures your system is performing as expected allowing you to react quickly when issues arise.

IND360tank/vessel Indicators
Seamless Tank and Vessel Weighing

IND360tank/vessel delivers fully integrated inventory control with broad PLC/DCS connectivity and process visualization.
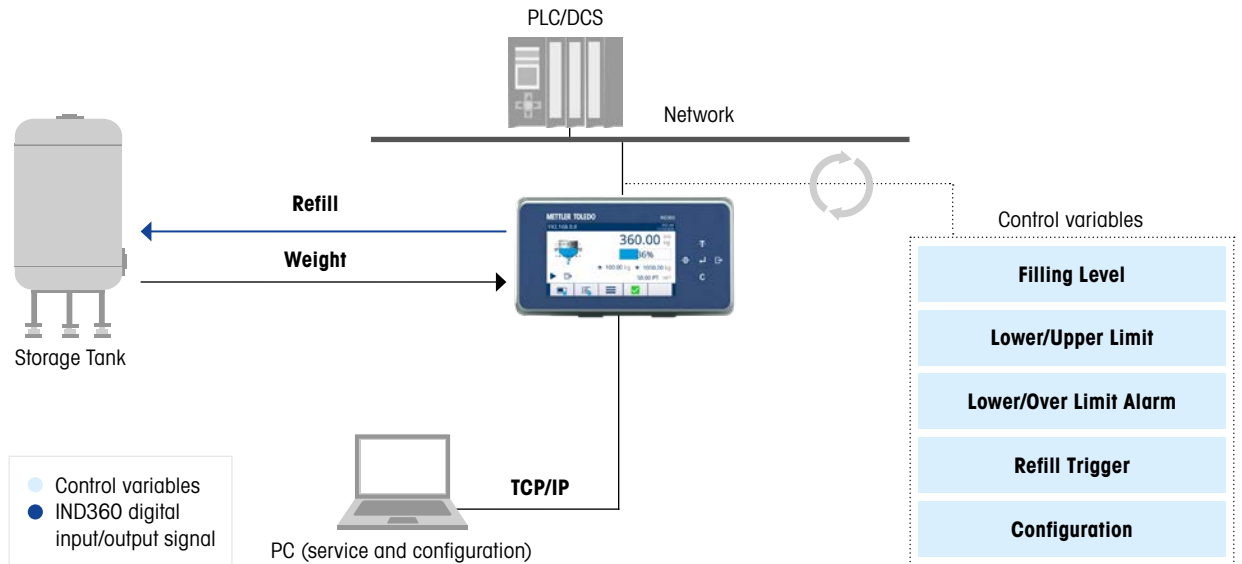
Features include:
- LoadAdvisor™ for guided setup and smart tank weighing
- High and low level alarm controls, with automatic refill
- PROFINET, Profibus DP, EtherNet/IP, Modbus RTU and 4-20mA
- Supports analog, POWERCELL® and high precision scales
- Automatic PLC-driven calibration of precision scales

METTLER TOLEDO
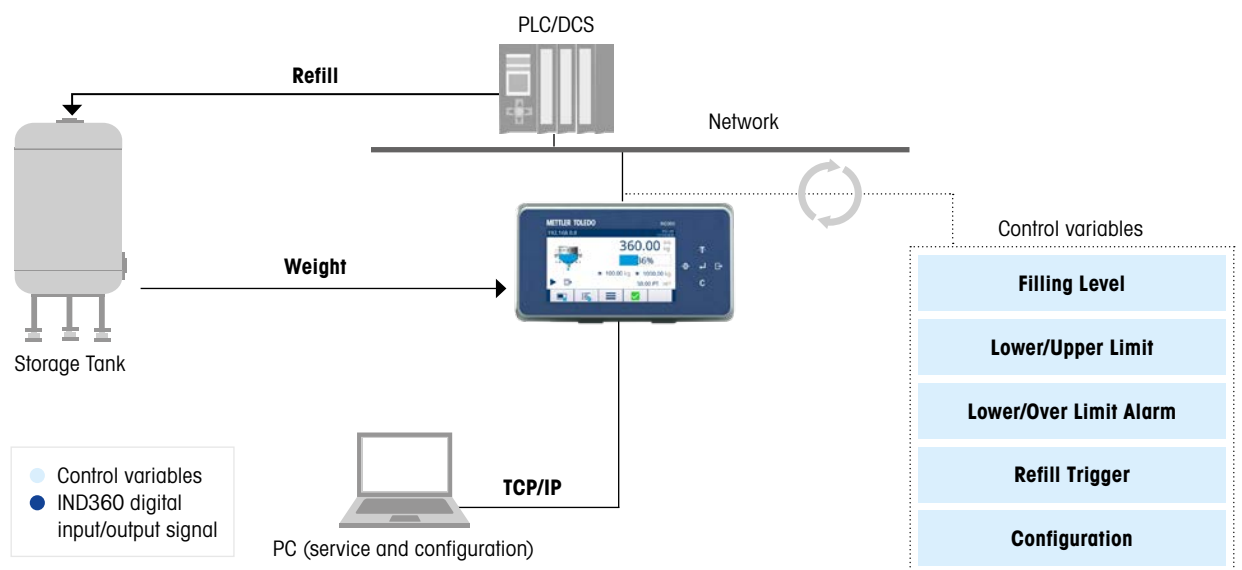
Automation System Connectivity

IND360 provides the optimal fit into your automation environment and serves your process needs by allowing the PLC/DCS to control all functions via the automation network.

Example 1: Automation Network with Direct Refill Control

PLC/DCS

Network

Refill

Weight

Storage Tank

Control variables

● Control variables
● IND360 digital
  input/output signal

TCP/IP

PC (service and configuration)

Control variables

| Filling Level |
| Lower/Upper Limit |
| Lower/Over Limit Alarm |
| Refill Trigger |
| Configuration |

IND360 controls the refill valve while providing visualization on HMI. Cyclic and acyclic access to application status information and read/write of configuration using PLC interface, display or web interface. Redundant ring topology for PROFINET and EtherNet/IP is supported.

Example 2: Automation Network with Indirect Refill Control

PLC/DCS

Refill

Network

Weight

Storage Tank

● Control variables
● IND360 digital
  input/output signal

TCP/IP

PC (service and configuration)

Control variables

| Filling Level |
| Lower/Upper Limit |
| Lower/Over Limit Alarm |
| Refill Trigger |
| Configuration |

PLC controls the refill valve based on IND360 refill signal and other control information, the IND360 monitors the filling level and provides visualization on HMI. Cyclic and acyclic access to application status information and read/write of configuration using PLC interface, display or web interface. Redundant ring topology for PROFINET and EtherNet/IP is supported.

Automation System Connectivity

Extremely fast, configurable, digital inputs/outputs and analog output for basic connectivity or stand-alone operation; allowing you to save valuable processing capability in your PLC/DCS for more critical activities.

Example 3: Digital Input/Output Connectivity with PLC/DCS
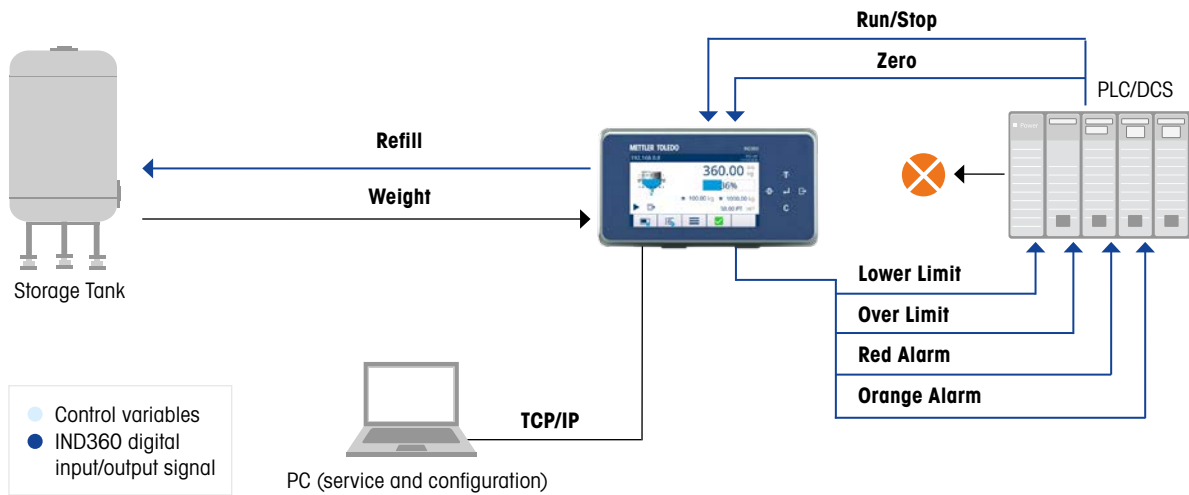
IND360 controls the refill valve and provides visualization on HMI. PLC access to status information and control functionality using digital I/O. Optional 4-20 mA weight output available for PLC/DCS connectivity. Configuration through web interface or display.

Example 4: Stand-alone without PLC/DCS
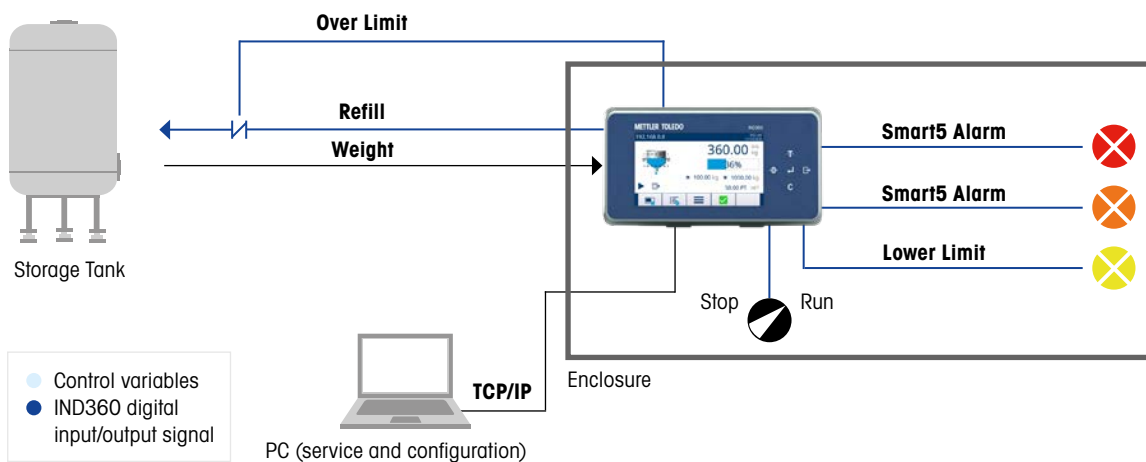
Stand-alone setup without PLC connectivity. IND360 controls refill valve and provides visualization on HMI. Start application with hardware switch attached to digital input of IND360. The "Over Limit Alarm" signal is attached to a safety switch acting as an emergency stop for refill. Configuration through web interface or display.

LoadAdvisor™ for POWERCELL® Systems

LoadAdvisor™ simplifies the setup of your tank scale, silo or storage container by providing step-by-step guidance and offering advanced condition monitoring.
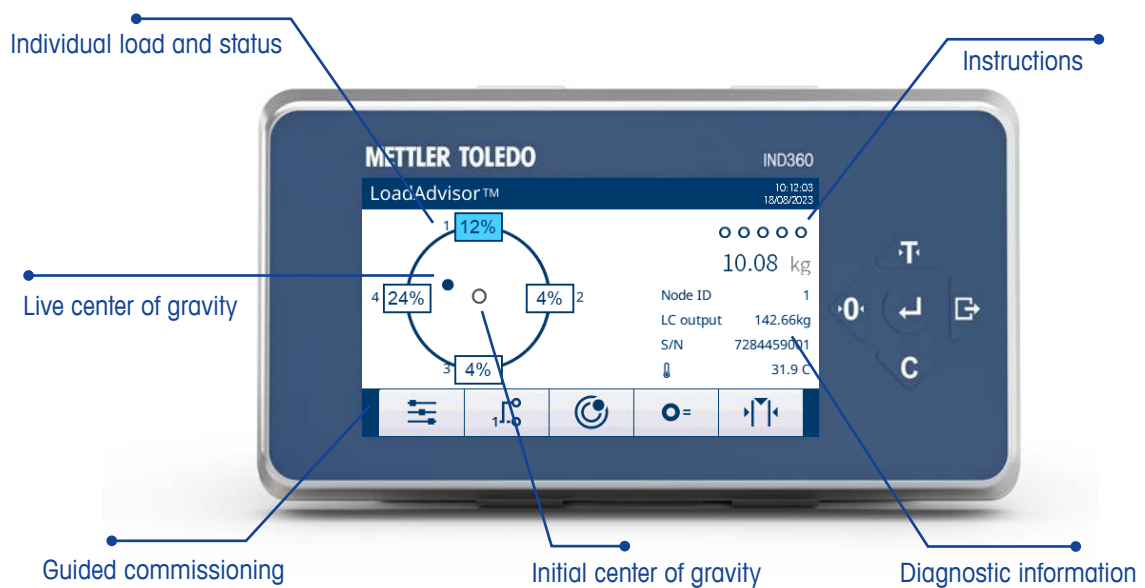
Guided setup

Guided setup saves time and costs, eliminates errors and improves measurement accuracy by enabling proper shimming and linearity adjustment. The initial setup guides you through the following steps:

Step	Description
Basic settings	Address weigh modules to setup the sensor network. Select from different container layouts and configure the number of sensors.

Mapping	Map weigh module position on screen to match physical setup.
	- Serial-number-based mapping: Select serial number from drop-down list to assign
	  each weigh module to its position.
	- Weight-based mapping: Load each weigh module individually to assign the position
	  on the screen.

Shimming	Level the system. Guided shimming mode indicates where to place the shims.
Shift adjustment	Adjust for off-center load to optimize accuracy for C6 and C10 load cells. Follow the guided procedure by loading each weigh module individually.
Adjustment	Test weight with or without substitution. Execute RapidCal™ (mt.com/ind-rapidcal).

Smart tank weighing

In operation, LoadAdvisor™ shows detailed condition monitoring information for each individual weigh module and for the entire tank scale.

Feature	Description	Benefit
Center of gravity monitoring	Monitor center of gravity and display graphically.	Monitor changes in center of gravity. Easily troubleshoot any abnormalities, e.g., material build-up on one side or mechanical interference of pipes as the load changes.
Individual weight readings	Read the weight value measured by individual weigh modules. Available on screen, web interface and automation system.	Detect anomalies such as blocked weigh modules. Increase uptime by quickly identifying the affected weigh module based on the position on the screen.
Temperature readings	Monitor temperature of each weigh module. Information available on PLC and on screen.	Detect weight changes caused by abnormal temperature during production process. Be aware of temperature changes that can also lead to the expansion of tank scale, change the piping forces, impact the supporting structure, etc.
RunFlat	Provide approximate weight value based on history (with higher measurement uncertainty) in case one weigh module fails.	Immediate notification when one weigh module fails and approximate the missing weigh module signal based on load distribution history. Thus enable continuous production and reduce the loss of production material due to unplanned stop.
CalFree+™	Initial adjustment of weighing system based on factory adjustment values stored inside the load cell.	CalFree+ is much more precise and easier to use compared to CalFree used in combination with analog load cells. Note: CalFree+ cannot replace the adjustment of the complete scale; it cannot account for environmental impacts, e.g., piping forces.
No junction box required	Multiple sensors are daisy-chained without the need for additional junction box hardware.	Minimize installation efforts, system footprint and potential sources of error.
Digital signal transmission	Weight readings are transmitted in a digital format.	Compared to analog signal transmission, which is typically in the mV range, the digital signal is more robust. POWERCELL® load cells are built and tested to withstand 10 V/m field strength and not influenced by electromagnetic interference. In case the cable gets damaged, cables can be replaced individually, and the re-calibration of the scale is not necessary as cables are not part of the measurement chain.
A/D conversion inside the load cell	A/D conversion and signal processing is integrated within each load cell separately. Individual adjustment factors per load cell are measured in the factory, and the parameters are stored in the load cell.	Receive highly accurate, individually adjusted measurement values. Replacement of defective load cell is possible without the need to readjust the system.

IND360tank/vessel
Automation Indicators

For full device specifications and additional drawings, please refer to the IND360base datasheet.

	Parameter	Description
Application	Filling level indication	Gross weight, percentage including graphical visualization
	Automatic refill	Configurable low and high thresholds I/O and PLC/DCS refill signals
	Refill monitoring	Low level monitoring, overfill protection
	Prioritized alarming	Smart5™ based on NAMUR NE107 Display notification Available on PLC/DCS network
	Configuration	Web interface (integrated web server) PLC automation interface IND360 Human Machine Interface (HMI)
	Statistics	Counters for lower limit, upper limit, refill operations
	LoadAdvisor™ (POWERCELL® ONLY)	Guided tank setup including: addressing, layout configuration, guided shimming, shift adjustment. Smart tank weighing features such as center of gravity monitoring, temperature monitoring, individual load cell readings, etc.
Measuring	Supported scale types	Analog (480Hz), POWERCELL® (100Hz for 1-4 load cells; 50Hz for 5-8 load cells), single-range Precision (up to 92 Hz)
	Digital filtering	Scale type dependent, removes mechanical and environmental noise, adjustable via PLC/DCS
	Tank calibration	RapidCal™ (mt.com/ind-rapidcal) CalFree™, CalFree Plus™ Test weight with or without substitution
PLC Connectivity	Industrial Ethernet	PROFINET, Profibus DP, EtherNet/IP, EtherCAT, CC-Link IE Field Basic, Modbus TCP, Modbus RTU
	Certification	PNO (Siemens), ODVA (Rockwell and others)
	Data exchange	Cyclic: 480 Hz bidirectional read/write data exchange via process image 16 byte or 64 byte Acyclic: dynamic data size
	Condition monitoring	Heartbeat 1Hz, Smart5™ alarms (NAMUR NE107), Individual POWERCELL® alarms, overload, underload, temperature, sensor network failure, etc.
	Selectable data	Up to 7 high-speed weight values (32-bit float), binary status for condition monitoring Device and application configuration, incl. set points (read/write) Device and application status information (read)
	Device description files	GSD and GSDML (for Profibus DP and PROFINET) EDS (for EtherNet/IP and others) Rockwell AOP integrated into Studio 5000
	Command set	METTLER TOLEDO Standard Automation Interface for tank vessel applications
	Sample code	Fully functional sample project for: Siemens TIA Portal (≥ V14 SP1) Rockwell Studio 5000 (≥ V24)
	4 – 20 mA weight output	For Gross, Net or Absolute Value Net 16 bit resolution
Digital I/O	Input signals	Up to 5 configurable inputs Functionality: run/stop, clear statistics, silence alarm, print, tare, clear tare, zero
	Output signals	Up to 8 configurable outputs Functionality: upper limit, lower limit, refill, Smart5™ orange alarm, Smart5™ red alarm, application alarm, center of zero, over capacity, under zero, motion, net, over-limit alarm, lower limit alarm
	Voltage	Logical high voltage: 10 … 30 VDC Logical low voltage: 0 … 5 VDC

Explore Our Service Solutions
Tailored to Fit Your Equipment Needs

METTLER TOLEDO Service delivers resources to enhance your efficiency, performance, and productivity by providing service packages that fit your operational needs, maximize your equipment lifetime, and protect your investment.

▶ **www.mt.com/IND-Service**

Start with professional installation

Installation services include support for your unique production situation:
- Professional IQ/OQ/PQ/MQ documentation
- Initial calibration and confirmation of fit-for-purpose
- Hazardous area installations

Extend your warranty coverage

Add two years of preventive maintenance and repair coverage to protect your equipment purchase and achieve maximum productivity and budget control.

Calibrate for quality and compliance

The professional Accuracy Calibration Certificate (ACC) determines measurement uncertainty in use over the entire weighing range. Corresponding annexes gives a clear pass/fail statement for specific tolerances applied, such as fit-for-purpose (GWP®), OIML R76, NTEP HB44, or further regulations.

Schedule maintenance

Full preventative maintenance plans offer inspection, functional testing, and proactive replacement of worn parts.

Health inspections offer a full assessment of current equipment condition with professional maintenance recommendations.

Maintain accuracy over time

Receive professional guidance (GWP® Verification™), including a routine testing plan that specifies four key factors to maximize your efficiency and ensure quality:
- Tests to perform
- Weights to use
- Testing frequency
- Tolerances to apply

METTLER TOLEDO Service

Our extensive service network is among the best in the world and ensures maximum availability and service life of your product.

www.mt.com/IND360-apps

For more information

ISO 9001 registered

ISO 14001 registered

CE