METTLER TOLEDO

IND9R86

Weighing Controller

Technical Manual

www.mt.com

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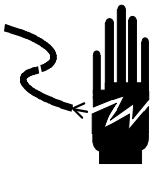

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FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

POUR ASSURER UNE PROTECTION SANS FAILLE CONTRE LES CHOCS ÉLECTRIQUES, BRANCHER UNIQUEMENT DANS UNE PRISE CORRECTEMENT MISE À LA TERRE. NE PAS ENLEVER LA BROCHE DE MISE À LA TERRE.

WARNING! / AVERTISSEMENT !

TO AVOID DAMAGE TO THE LOAD CELL, REMOVE POWER FROM THE IND9R86 AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

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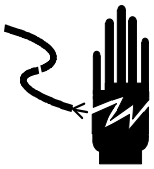
WARNING! / AVERTISSEMENT !

THE IND9R86 IS NOT INTRINSICALLY SAFE! DO NOT USE WITHIN AREAS CLASSIFIED AS HAZARDOUS BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.

L'IND9R86 N'EST PAS D'UNE SÉCURITÉ INTRINSÈQUE ! N'EMPLOYEZ PAS DANS DES SECTEURS CLASSIFIÉS COMME DANGEREUX EN RAISON DES ATMOSPHÈRES COMBUSTIBLES OU EXPLOSIVES.



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WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

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CAUTION / ATTENTION

BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT AND/OR BODILY HARM.

AVANT DE BRANCHER ET DE DÉBRANCHER LES COMPOSANTS ÉLECTRONIQUES INTERNES OU D'EFFECTUER DES CONNEXIONS ENTRE LES APPAREILS ÉLECTRONIQUES, TOUJOURS METTRE HORS TENSION ET ATTENDRE AU MOINS TRENTE (30) SECONDES AVANT DE CONNECTER/DÉCONNECTER LES APPAREILS. NE PAS RESPECTER CES CONSIGNES POURRAIT ENTRAÎNER DES BLESSURES OU ENDOMMAGER, VOIRE DÉTRUIRE L'APPAREIL.

CAUTION / ATTENTION

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IND9R86

Controller

ServiceXXL

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There are several important ways to ensure you maximize the performance of your investment:

1. **Register your product:** We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.

2. **Contact METTLER TOLEDO for service:** The value of a measurement is proportional to its accuracy – an out of specification scale can diminish quality, reduce profits and increase liability. Timely service from METTLER TOLEDO will ensure accuracy and optimize uptime and equipment life.

    a. **Installation, Configuration, Integration and Training:** Our service representatives are factory-trained, weighing equipment experts. We make certain that your weighing equipment is ready for production in a cost effective and timely fashion and that personnel are trained for success.

    b. **Initial Calibration Documentation:** The installation environment and application requirements are unique for every industrial scale so performance must be tested and certified. Our calibration services and certificates document accuracy to ensure production quality and provide a quality system record of performance.

    c. **Periodic Calibration Maintenance:** A Calibration Service Agreement provides on-going confidence in your weighing process and documentation of compliance with requirements. We offer a variety of service plans that are scheduled to meet your needs and designed to fit your budget.

Contents

Chapter 1.0

Introduction and Overview

This chapter covers

- Introduction
- Model identification
- Standard and optional features
- General system description
- Dimensions
- Scales and metrology
- Contents checklist
- Contact information

Introduction

The IND9R86 Weighing Controller is used to weigh rail cars as they cross a scale at speeds up to 10 km/hour (6 mph). It automatically detects individual railcars as they cross the scale and provides transaction reports of both individual railcars and the entire train.

This chapter provides an overview of the controller's features and specifications.

Figure 1-1: IND9R86 Weighing Controller

WARNING! / AVERTISSEMENT !

THIS DOCUMENT SHOULD BE USED AS GUIDANCE WHEN SELECTING INSTALLATION, MOUNTING AND APPLICATION LOCATION FOR IND9R86. HARDWARE CONNECTION, EQUIPMENT SETUP AND REPAIR SHOULD BE CARRIED OUT ONLY BY QUALIFIED PERSONNEL OR METTLER TOLEDO AUTHORIZED REPRESENTATIVES. THE WARRANTY BECOMES NULL AND VOID IF REPAIR OR ADJUSTMENT IS MADE BY UAUTHORIZED PERSONNEL. READ THIS DOCUMENT CAREFULLY BEFORE INSTALLATION.

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Model Identification

The IND9R86 model number and serial number are located on the data plate on the side of the controller. Refer to Figure 1-2 to verify the configuration of your IND9R86.

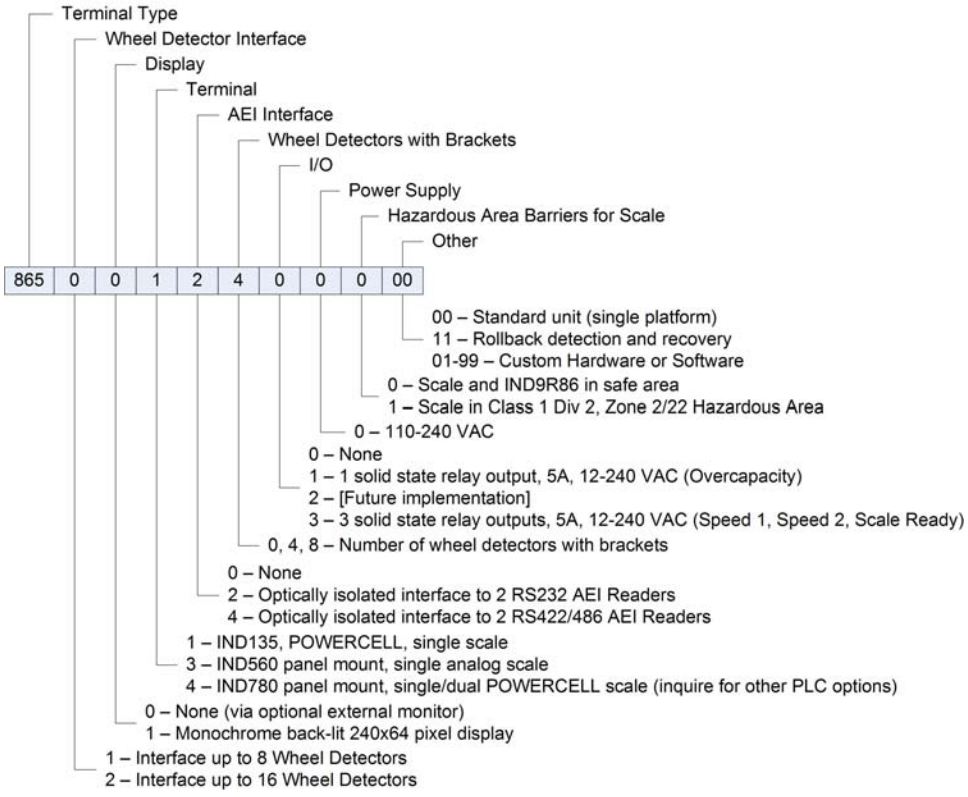

Figure 1-2: Model Identification Number

IND9R86 Features

Standard Features

The IND9R86's standard features are:

- Interface to METTLER TOLEDO 7260CIM rail scale (one or two platforms) or other analog rail scale (single platform)
- Automatic weighing of railcars as they cross the scale at speeds up to 10km/hr
- Interface to optional railcar wheel detectors for identification of railcar type, direction, and speed
- PC with MS Windows® XP with Ethernet, USB, and serial interface to peripheral devices
- Train transaction data storage and reporting
- Rugged stainless steel enclosure suitable for wall mounting

Optional Features and Accessories

In addition to its standard features, the IND9R86 can be equipped with the following options:

- Interface to AEI (Automatic Equipment Identification) readers for integration of RFID tag data into the transaction
- 240 x 64 pixel monochrome backlit graphical LCD display for weight display and operator messages
- USB printer
- Audio speed feedback via radio
- Scale activation/deactivation via radio
- Barriers for installation in a hazardous area
- I/O to traffic signals and other devices
- Wireless Ethernet Communication
- External 17" LCD Monitor
- Remote display and user interface buttons suitable for outdoor mounting
- On-Line Uninterruptible Power Supply

Documents Provided on CD-ROM

The following documents are provided on the CD-ROM supplied with the IND9R86 weighing controller:

- IND9R86 User's Guide
- IND9R86 Technical Manual (this document)
- Industrial PC Manual
- Weighing Terminal User's Guides, Installation, Technical and PLC Interface Manuals: IND135, IND560, IND780

- Spreadsheet for calculating system accuracy during setup

General System Description

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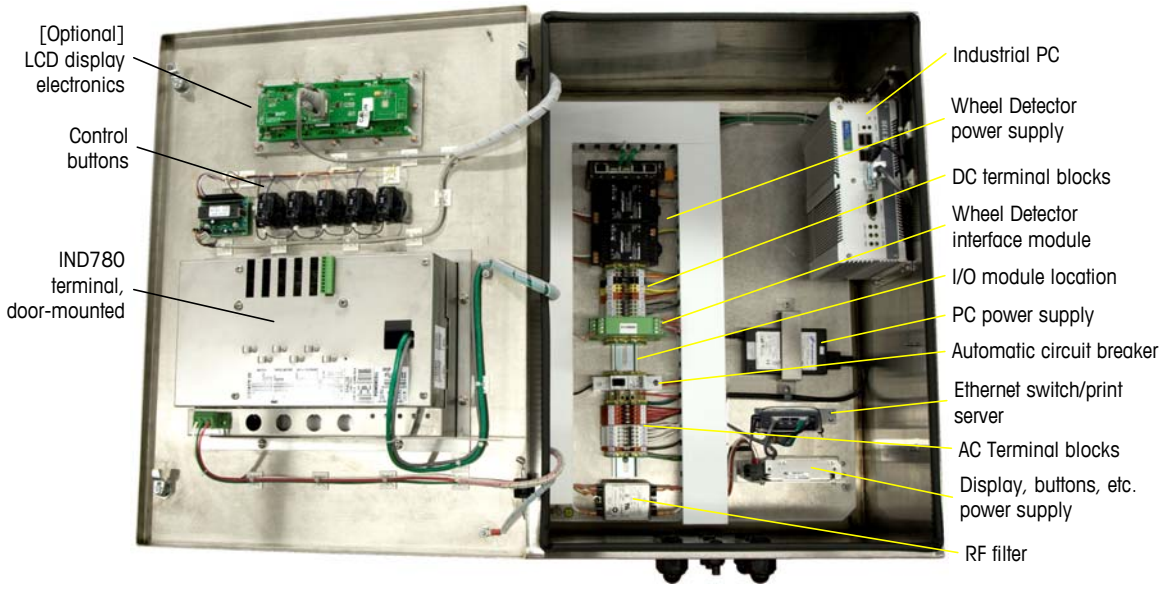
L'IND9R86 N'EST PAS D'UNE SÉCURITÉ INTRINSÈQUE ! N'EMPLOYEZ PAS DANS DES SECTEURS CLASSIFIÉS COMME DANGEREUX EN RAISON DES ATMOSPHÈRES COMBUSTIBLES OU EXPLOSIVES.

The IND9R86 weighing algorithm is processed via a software program loaded onto an industrial computer (callout 2 in **Figure 1-3**) installed inside the IND9R86. IND9R86 is intended for use with the METTLER TOLEDO digital load cells integrated in a POWERCELL uniform weighing network. Each load cell included in the weighing system has a unique network address. Optionally, IND9R86 can be interfaced to a rail scale using analog load cells.

Internal Layout and Signal Processing

Figure 1-3 shows the internal components of the IND9R86.



* The terminal model will differ depending on system configuration. This illustration shows the controller with a door-mounted IND780 terminal.

Figure 1-3: IND9R86 Internal Layout of Components

Figure 1-4 provides a graphical representation of signal processing within the IND9R86, between the IND9R86 and various peripheral components, and its operator interface/s.

Notes: The **Scale Terminal** may be connected to the **PC** by a serial or Ethernet connection, or by both. The **PC** executes the IND9R86's dynamic weighing program. The **Automatic Circuit Breaker** is used during system start-up.

If analog load cells are used, it is recommended that the optional **Lightning Protector** be included in the system. Lightning protection for analog load cells is not supplied as part of the IND9F86, and may be ordered separately (reference MT part # TB-100780-1).

An on-line Uninterruptible Power Supply (reference MT part # 90818800D) is recommended for all installations.

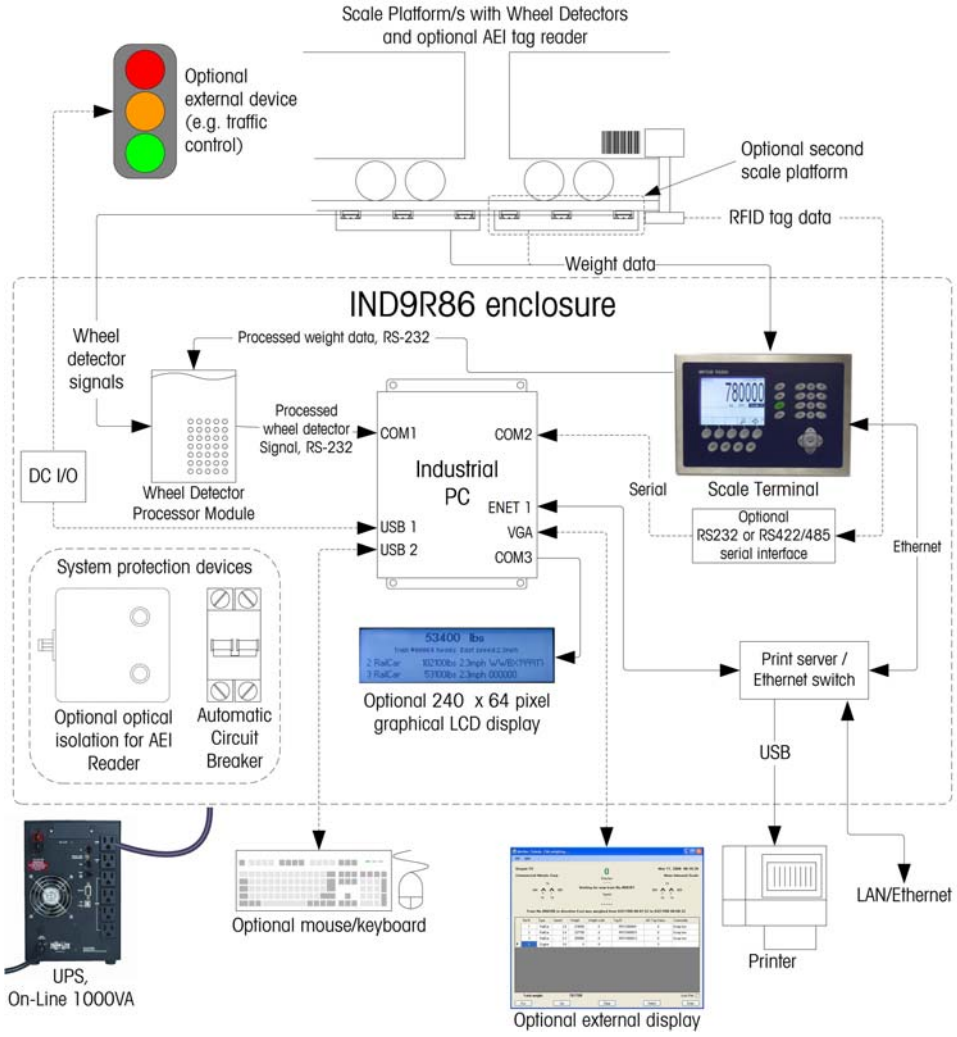


Figure 1-4: Signal Processing

The electrical schematic in Figure 1-5 provides further detail about interconnections between the controller's components, in this case including a JagXtreme scale terminal and optional I/O.

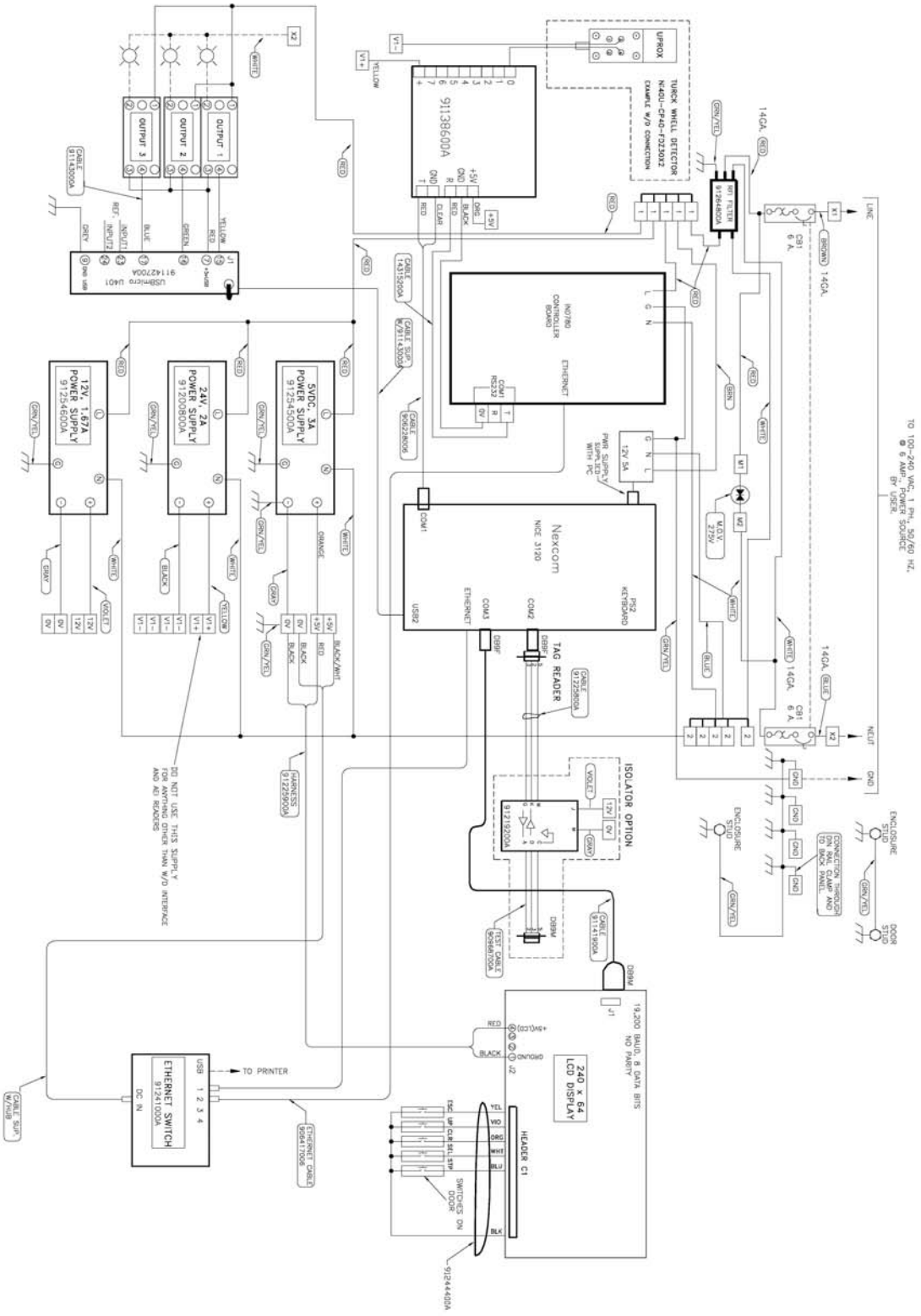


Figure 1-5: IND9R86 Electrical Schematic, Including Optional I/O

Dimensions

Terminal Dimensions

The IND9R86 enclosure is constructed of 304 stainless steel, and measures 457 mm / 18 inches wide 610 mm / 24 inches high and 305 mm / 12 inches deep. Note that this height dimension does not include cable glands and mounting hardware that extend beyond the top and bottom of the enclosure. These add a further 77mm / 3" to the height, as indicated in Figure 1-6.

Figure 1-6 and Figure 1-7 indicate the terminal's dimensions in inches and mm.

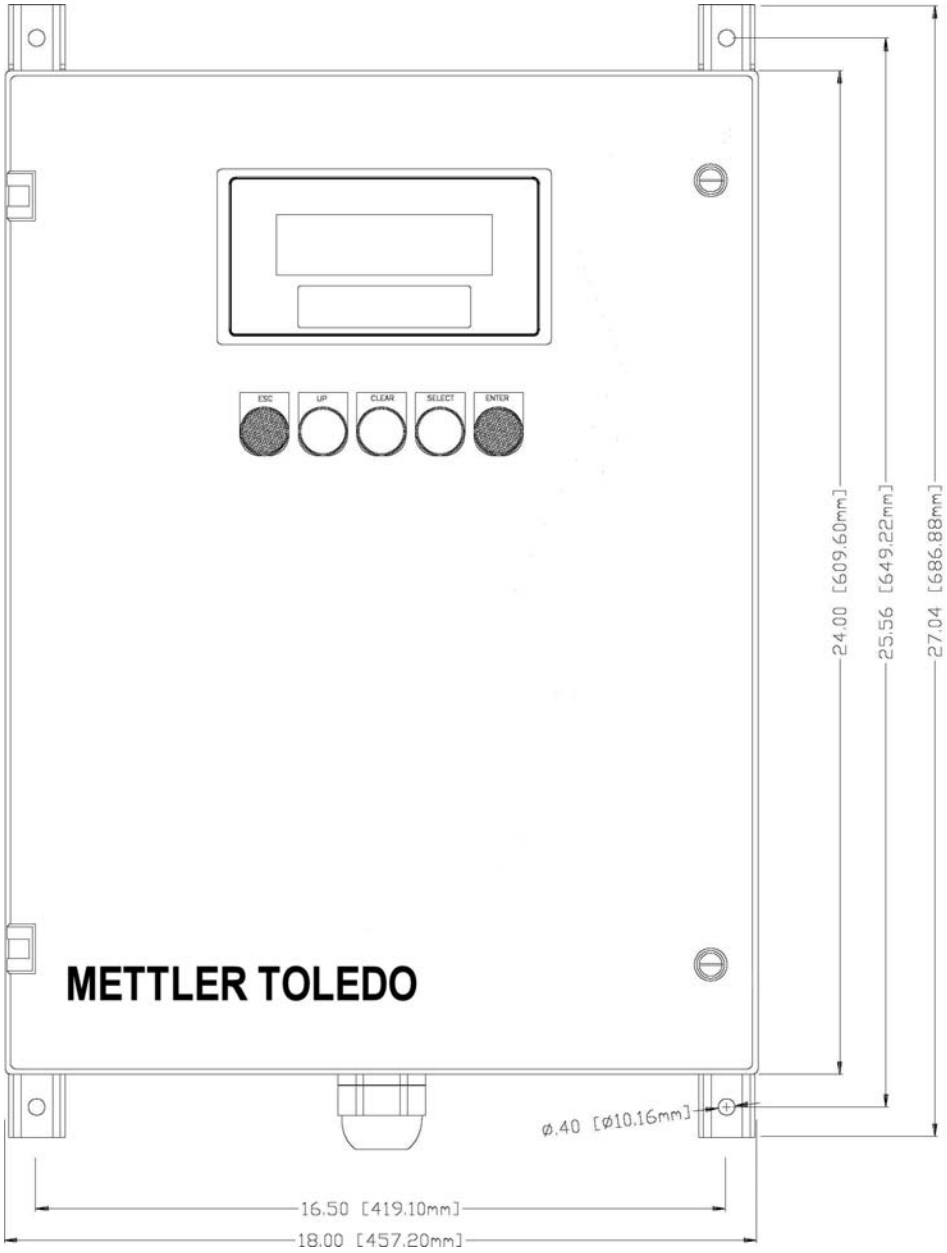


Figure 1-6: IND9R86 Dimensions, Front View

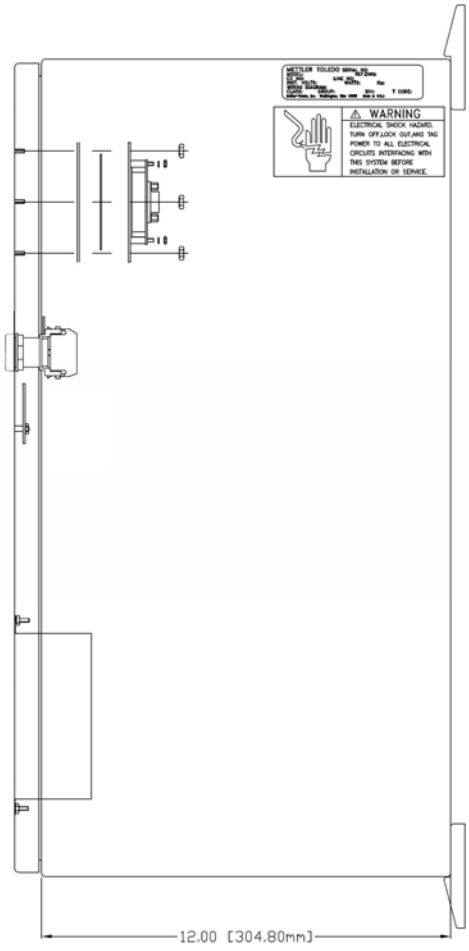


Figure 1-7: IND9R86 Dimensions, Side View

Shipping

The controller and its accessories are shipped on a 30″ x 42″ pallet.

Scales and Metrology

The IND9R86's specifications are as follows:

• Load cell types	Up to 16 MTX or analog load cells in a single or dual scale configuration, depending on scale terminal selected
• Capacity	1~400,000 kg (880,000 pounds). See Model 7260CIM for scale capacity information
• Maximum number of divisions	1,000~10,000 divisions Increments: 22.6 kg / 45.4 kg / 90.7 kg (50 lb / 100 lb / 200 lb)
• Supported units	lb, kg, tons and metric tons
• Accuracy	OIML R-106 Class 1.0 and Class 0.5 (pending), NTEP HB44

Contents Checklist

The IND9R86 includes the following items:

- Enclosure housing scale terminal, PC, display, wheel detector processor module and wheel detector interface module/s*
- Wheel detectors with mounting brackets*
- IND9R86 documentation CD-ROM

  * Determined by model configuration.

If the shipping container is damaged, check for internal damage and file a freight claim with the carrier if necessary. If the container is not damaged, remove the protective packaging and inspect each IND9R86 component for damage. If you need to ship the IND9R86, it is best to use the original shipping container. The Controller must be packed correctly to ensure its safe transportation.

Safe Disposal Requirement

In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

Contact Information

Questions regarding the design or installation of the weighing controller should be addressed to the METTLER TOLEDO local offices, or to:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, OH 43240

614 438-4511

www.mt.com

Chapter 2.0

Operation

Introduction

This chapter covers

- Operation using LCD and buttons
- Automatic weighing mode
- Stand-by mode functions
- Operation using Windows® remote desktop
- Retrieving and printing database information

This chapter explains the features and functions of the IND9R86's user interface, and its operation in both automatic and manual weighing modes. Details of configuration parameters and options are available in Chapter 3.0, **Setup and Configuration**.

The first section of this chapter deals with operation using the weighing controller's external buttons. The second part illustrates operation using Windows® remote desktop with a monitor, keyboard and mouse. Functionality in this case is identical to that described for button operation, but more information can be seen on-screen.

Overview: Operation Using LCD and Buttons

The IND9R86 has an optional monochrome graphical LCD display (**Figure 2-1**) mounted to the door of its enclosure. This display is used to show system status, weight data, configuration menus, and operational messages.

Figure 2-1: IND9R86 LCD Display

When a highlighted zero symbol (>0<) appears in the top line of the display, this indicates that the scale is within 1/4 increment of zero. When motion is detected on the scale, a tilde (~) appears to indicate this.

In general, the rows of the display are configured as follows:

Row	Automatic Mode	Stand-by Mode
1	Current weight reading from scale	Current date and time
2	Train number, direction and speed	
3	Most recent car number, weight, speed and ID	

Row	Automatic Mode	Stand-by Mode
4	Previous car number, weight, speed and ID	Current weight reading from scale

When the system is in stand-by mode, the information displayed on the LCD depends on the function currently accessed.

Optionally, the Weighing Controller can be equipped with an external LCD display. Refer to **Operation Using PC Display**, starting on page 2-5.

Weighing Controller Keypad

The IND9R86 industrial Weighing Controller is optionally equipped with 5 pushbuttons (Figure 2-2) mounted to the enclosure door below the LCD display.

Figure 2-2: Operator Interface with Keypad Buttons

These pushbuttons are used to navigate the menu tree and activate functions. Connection of an external monitor (to the VGA port of the industrial PC) and mouse (to the USB2 port of the industrial PC) permits navigation and control to be performed by clicking on-screen icons representing the buttons.

The buttons' functions depend on context (what function is being performed). The following table gives an overview of how each button acts in a variety of conditions.

Table 2-1: Keypad Button Functions

Buttons	Automatic	Stand-By	Top Menu
	Enter stand-by mode.	n/a	Return to stand-by mode

Buttons	Automatic	Stand-By	Top Menu
UP		Step back through previous car weights and IDs	
ZERO	Zero scale	Zero Scale	
SELECT		Step forward through previous car weights and IDs	Display next top menu
ENTER		Enter automatic weighing mode	

Scale terminal configuration is best carried out using the remote desktop feature, accessed via the scale terminal web browser or host program. These functions are described later in this chapter (for operation) and in Chapter 3 (**Setup and Configuration**) and Chapter 5 (**Service and Maintenance**). The description of setup options also includes suggested settings.

Automatic Weighing Mode Operation

Overview

Figure 2-3 shows the relationship between the two operating modes (Automatic Weighing and Stand-by) and the menu items accessible to the operator.

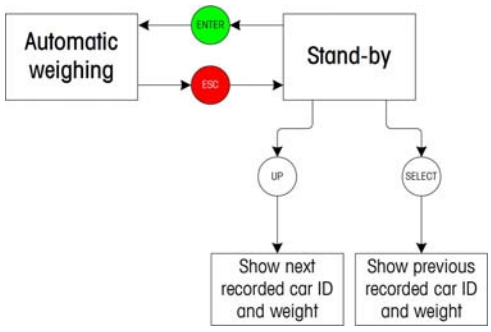


Figure 2-3: Overview of Operator Interface Screens

When the system is in Automatic Weighing mode, the weighing controller records and saves and, optionally, prints weight information from moving trains, without operator intervention.

When the scale is idle, the LCD display shows the current scale weight, a message indicating the next train number in sequence, the current time and date, and the results of the most recent rail car weighments (Figure 2-4).

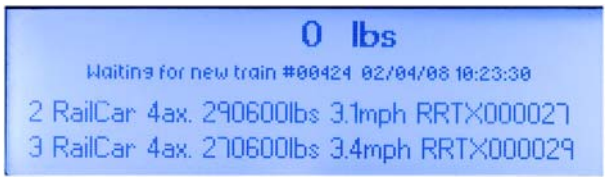


Figure 2-4: Automatic Mode, Ready to Weigh Train

System Initialization and Start-Up

When power is applied to the IND9R86, the controller tests each of its component devices. Once system integrity has been checked successfully, the PC operating system is started, communication is tested and the scale terminal initializes. Scale terminal initialization tests the connection with load cells.

At the end of the start-up sequence, the IND9R86 enters Automatic Weighing mode, waiting for a new train. On the LCD display, the current time and date are updated.

Figure 2-5 gives an overview of Automatic weighing mode.

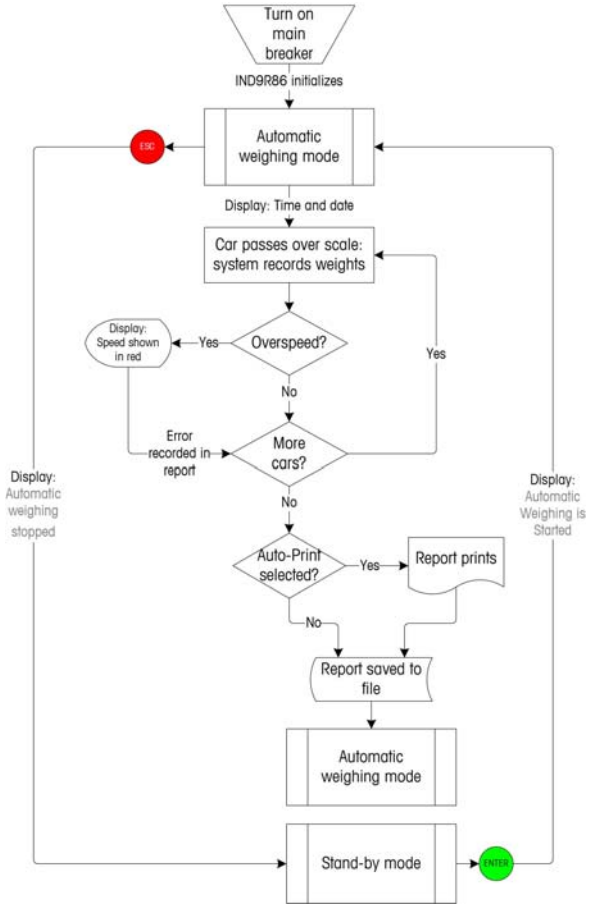


Figure 2-5: Automatic Operation

Train Weighing

Once a train is detected on the scale platform/s, the display (Figure 2-6) shows:

- current weight on the scale
- train identification number, with its direction and current speed
- time and date information for the current train
- information collected for the most recently weighed car

The controller ignores locomotives. Pressing the ESC button while a train is being weighed, or while the system is processing train data, will abandon the process and a report will not be generated.

Figure 2-6: Display During Train Weighing

Once the controller recognizes that the train has left the scale, the system displays a summary of the information collected (Figure 2-7).

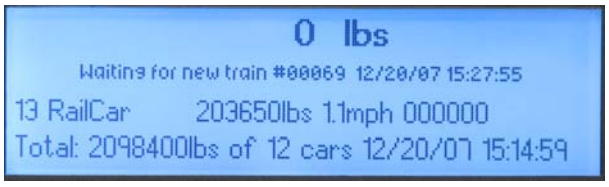


Figure 2-7: Train Data Summary

Operation Using PC Display

The system can be configured, either at the factory or in the field, with an external display connected to the VGA port of the IND9R86's PC.

Automatic Weighing of Moving Railway Cars

Operation using a remote desktop is identical to operation using buttons, described in the first part of this chapter. However, the remote desktop provides more detailed information about system status and function.

Figure 2-8 illustrates data shown on an external display after a train has been weighed, while the system is idle.

The train speed is registered on the additional display in black font. When an overspeed error is detected (i.e. train speed exceeds value configured in the IND9R86 Configurator), the speed display changes to bold and yellow or red,

depending on which of the speed conditions (speed marginal, speed over maximum allowed) has occurred.

Overview of PC Display

When the optional LCD or PC display is used with the IND9R86, the screen includes information as seen in Figure 2-8. Note that in this case, Allow Post Train Editing (set in the IND9R86 Configurator's **Processing** tab) is disabled.

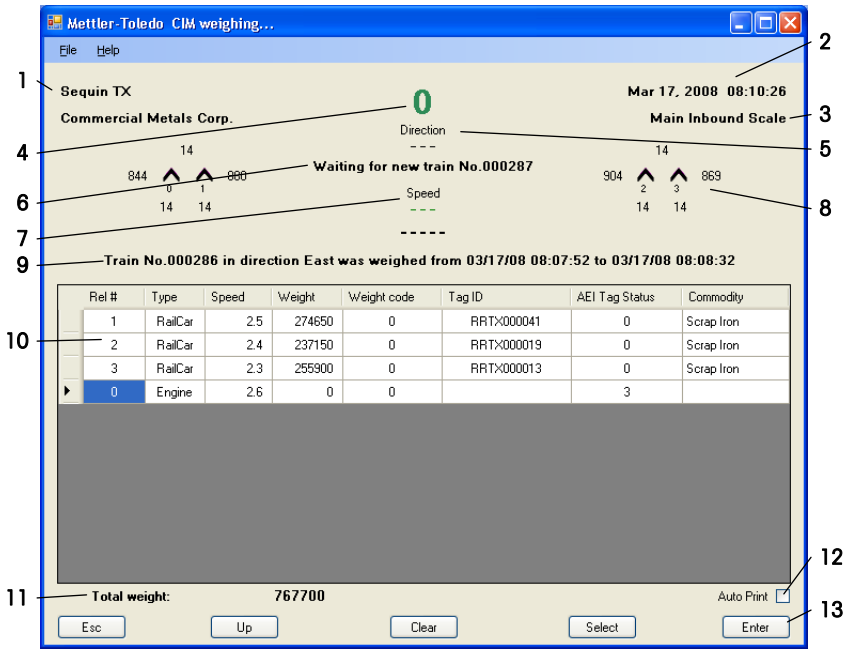
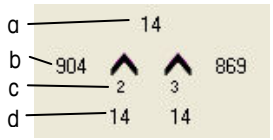


Figure 2-8: PC-Based IND9R86 Interface

Data available in the PC interface include:

Table 2-2: PC Display Elements

Item	Function
1**	Location of installation and company name
2*	Current date and time, as specified in the Windows XP® operating system.
3**	Scale name
4*	Current weight on scale platform
5*	Train direction
6*	Current system status
7*	Train speed

Item	Function
8*	These displays, one at either side of the screen, contain information about the state of the wheel detectors:  a. The top number of each array indicates the number of axles that have been read. If a train reverses over the scale, this reading decreases for each of the two sets of wheel detectors. b. The middle line includes two carets (^), representing the wheel detectors. As a detector is actuated, it shows red on the screen. The numbers adjacent to the carets represent the duration of the detector's most recent actuation. c. Fixed wheel detector identifiers – 0, 1, 2 and 3, for a system with four wheel detectors. d. The bottom row shows the number of actuations for each wheel detector; this number increments no matter what direction the train is moving.
9*	General information about the most recently weighed train
10*	Train data for most recent train weighed; refer to Table 2-4, below, for an interpretation of this information
11*	Total weight of most recently weighed train
12	Auto-print indication; when checked, train report prints automatically after weight data processing is complete
13	Array of softkeys, replicating function of front-panel buttons

* Values calculated and displayed by the IND9R86.

** Information entered using the IND9R86 Configurator.

Post-Train Editing

Important: Processing of trains is **suspended** while train data are being edited. Be sure to complete and commit edits **before** a new train is expected.

If **Post Train Editing** is enabled (in the **Processing** tab of the IND9R86 Configurator), once a train weighment is complete a dialog box appears offering the option to edit train data manually:

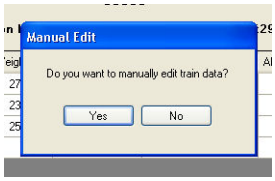


Figure 2-9: Manual Editing Dialog Box

If **No** is selected, a train report is generated and the train is stored in the database.

If **Yes** is selected, the softkeys (item 13 in Table 2-2, above) disappear, a **Commit Edits** button appears (Figure 2-10), and the system status line reads "Processing Suspended."

The following items can now be edited:

- Tag IDs with an AEI Tag Status of 3 (No Read) and 4 (Left/Right mismatch)
- For each car, a free text entry of up to 50 characters, in far right column (in this example labeled "Commodity")

Use a mouse to select the element to be modified, and a keyboard to enter the corrected data. Other fields, such as Speed and Weight, cannot be modified.

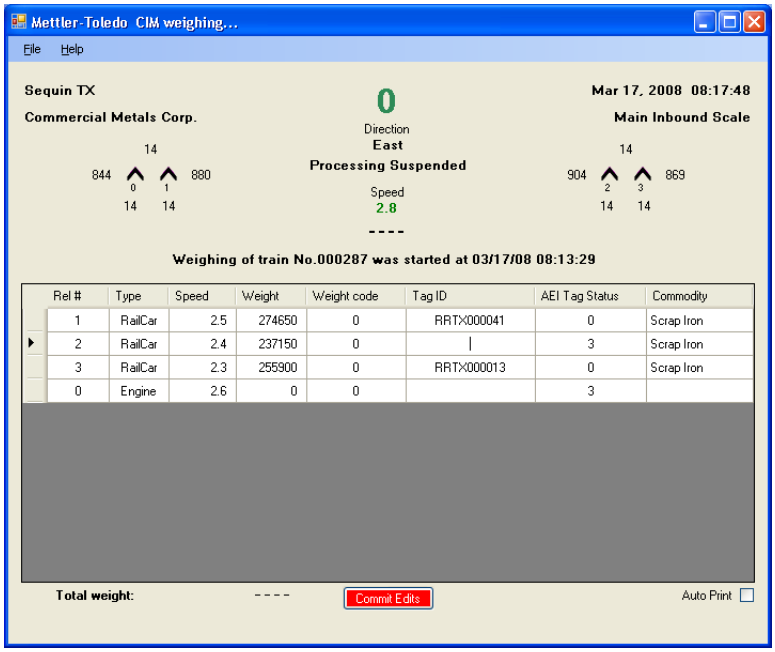


Figure 2-10: Post-Train Editing Screen

When editing is complete, click the **Commit Edits** button to generate the train report, save the train to the database and return to the run-time screen (Figure 2-11). Note that the modified Tag ID now has a status of 5 (Manual Entry), and that the "Commodity" information appears.

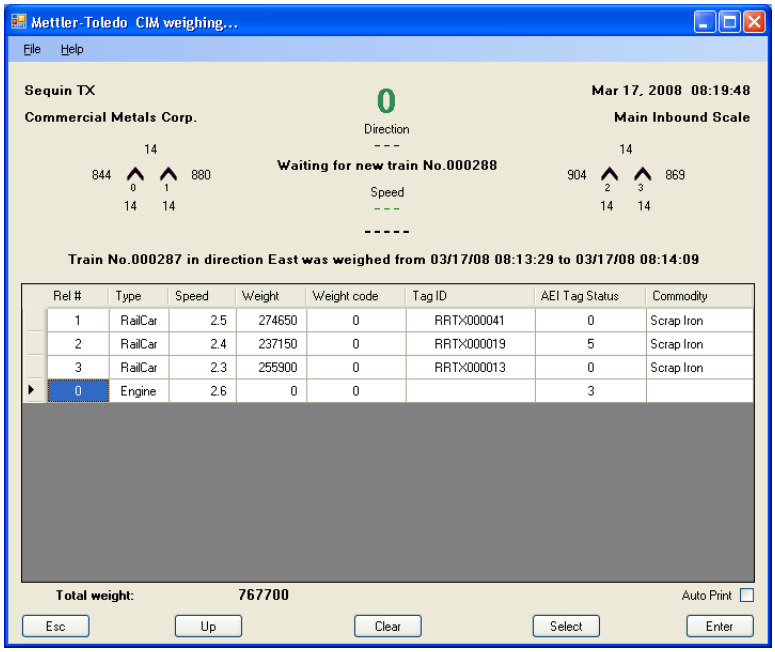


Figure 2-11: Run-Time Screen, Tag ID and Commodity Field Edited

Reports

Report files are stored in the "Reports" folder on the Weighing Controller hard disk. Access to the folder is possible via Ethernet using FTP protocol. Report files are formatted as **.pdf** files (which may be exported and read using Adobe® Acrobat®) and, optionally, as **.csv** files.

Accessing Database Files

Database files can be read using Microsoft® Access. Access is not included on the controller's industrial PC, so files must be downloaded via Ethernet to a remote PC for reading and analysis. Use ALT-TAB to access the Windows desktop in order to export database files. The file locations are set in the IND9R86 Configurator utility. A text file that logs system events is also available. Default locations are:

File	Database Name and Default Location
Archive database	C:\RollBack\CIMarchive.mdb
Train weighing database	C:\RollBack\Trains.mdb
Log file	C:\RollBack\CIMLog.txt

.csv File Format and Contents

The .csv data file format is a variable length, comma delimited ASCII file with each record terminated with a Carriage Return Line Feed character. Each record in the file represents a single train unit. The name of the data file is created in the format **Tnnnnnn mmddyy hhmmss.csv**.

where

T	The letter T identifying this as a train file
nnnnnn	6 digit train number
mm	2 digit month
dd	2 digit day
yy	2 digit year
hh	hours (24 hour format)
mm	minutes
ss	seconds

Each record contains the following elements:

Table 2-3: .csv Log File Contents

Field	Type	Max. Size	Description
Train #	Long Int	n/a	Sequential train number
Sequence #	Long Int	n/a	Sequence # of car in the train
Tag ID	String	10	AEI Tag ID of Rail Car
Truck1 Wgt	Long Int	n/a	Weight of truck 1
Truck2 Wgt	Long Int	n/a	Weight of truck 2
Gross Wgt	Long Int	n/a	Total weight of Rail Car
Direction	String	50	Direction Rail Car was weighed
Speed	Single	n/a	Speed of Rail Car
Time	String	8	Time Rail Car was weighed (HH/MM/SS)
Date	String	10	Date Rail Car was weighed (MM/DD/YYYY)
AEI Status Code	Byte	n/a	AEI Tag read status. Value between 0-4 (refer to Table 2-5).
Speed/Weight Code	Byte	n/a	Speed or Weight code. Value between 0-9 (refer to Table 2-6)
Commodity*	String	50	Manually-entered descriptive data for each car

* The "Commodity" label is configurable, set in the **Database Settings** tab of the IND9R86 Configurator.

Report Format and Contents

Figure 2-12 shows an example of a report for a car consisting of one engine and three cars. The data collected here reflects that displayed on the run-time screen, except that the individual truck weights are recorded.

Sequin TX — Commercial Metals Corp. — Commodity

Unit of Measure: LB
Max Speed: 5.0
Max RailCar Weight: 300000

Train No. 000287 — In direction East — Started at 03/17/08 08:13:29

Rel #	Unit	Speed	Weight	Truck 1 Weight	Truck 2 Weight	ID tag	AEI Tag Status	Weight Code	Commodity
1	RailCar	2.5	274,650	134,300	140,340	RRTX000041	0	0	Scrap Iron
2	RailCar	2.4	237,150	122,260	114,900	RRTX000019	5	0	Scrap Iron
3	RailCar	2.3	255,900	128,020	127,900	RRTX000013	0	0	Scrap Iron
0	Engine	2.6	0	0	0		3	0	

Total weight: 767700 — Weighed at 03/17/08 08:14:09

Figure 2-12: Sample Report

For each car, a report contains:

Table 2-4: Train Report Contents

Element	Explanation
[Header text]	From values entered in the Configurator: Location, company name, Free Text Field Description, maximum speed of train, maximum permissible railcar weight. From the Controller: Train serial number, train direction, unit of measure, and time and date the train weighment was started
Rel #	Car's sequence number in train, counting from zero, including engine/s
Unit	The type of car – engine, buffer car or rail car. Weights are recorded and summed only for rail cars.
Speed	Speed at which the weighed car crossed the scale
Weight	The gross weight recorded for the car, in primary units defined for the Indicator. This figure is the sum of the two truck weights.
Truck 1 Weight	Weight of first and second trucks, in primary units.
Truck 2 Weight	
ID tag	10-character car ID tag data, if any
AEI Tag Status	Indicates the status of the AEI tag read – refer to Table 2-5.
Weight Code	Indicates the status of the weighment – refer to Table 2-6.
Commodity	The heading of this column is set by the **Free Text Field Description** parameter, set on the Database Settings tab of the IND9R86 Configurator.

Table 2-5: AIE Status Code Definitions

Code	Explanation
0	Data received from both AIE Readers, tag data match
1	No data received from AEI Reader #1
2	No data received from AEI Reader #2
3	No data received from either AEI Reader
4	Data received from both AEI Readers, but data do not match
5	Manual Tag ID Entry

Table 2-6: Speed/Weight Code Definitions

Code	Explanation
0	Train was traveling at the OK Speed*
1	Train was traveling at the MARGINAL Speed*
2	Train was traveling at the TOO FAST Speed*
4	Rail Car exceeded Over Weight limit*
9	Car was traveling at the TOO FAST speed when the weight was taken, and the system is set up for OVER SPEED FATAL.*

* Speed and weight values are set in the IND9R86 Configurator.

Chapter 3.0

Setup and Configuration

Configurator Utility

The IND9R86 is set up using a configurator utility that is separate from the train controller application. The application itself does not contain any user-configurable settings. The configurator permits basic system parameters to be configured, calibration offsets to be entered, etc. It should be accessed only by qualified Mettler Toledo personnel. Its functions are described in the **IND9R86 Configurator Guide**.

Chapter 4.0

Installation

This chapter covers

- Power requirements
- Environmental requirements
- Mounting location requirements
- Mounting the controller
- Connections
- Metrological sealing
- Conduit layout
- Lightning protection

Introduction

This chapter provides instructions for installing and connecting the IND9R86. The controller is designed for use in an indoor, climate-controlled environment.

Power Requirements

IND9R86 should not share power lines with noise-generating equipment like heavy load switching, motor starter circuits, RF thermal heaters, inductive loads and the like. If adverse power conditions exist, a dedicated power circuit or power line conditioner may be required.

⚠ WARNING! / AVERTISSEMENT !

TO AVOID ABNORMAL DE-ENERGIZATION IT IS RECOMMENDED TO CONNECT THE IND9R86 TO AN UNINTERRUPTIBLE POWER SUPPLY.

POUR ÉVITER LA PERTE ANORMALE DE PUISSANCE ON LUI RECOMMANDE DE RELIER L'IND9R86 À UNE ALIMENTATION D'ÉNERGIE NON INTERRUPTIBLE.

To connect IND9R86 to a power supply, a power cable (not included) that complies with local electrical codes is required. When connecting the cables, check up correctness of location of phase and null conductors on corresponding socket terminals.

To ground IND9R86, a grounded circuit is required, located, according to the working instruction requirements, at a distance not more than 300 mm from the bottom surface of the IND9R86 enclosure.

The integrity of the power ground for equipment is important for both safety and dependable operation of the IND9R86 and its associated equipment. A poor ground can result in an unsafe condition if an electrical short develops in the equipment. A good ground connection is needed to assure extraneous electrical noise pulses are minimized.

AC power input to the controller must be as follows:

- 110 - 240 VAC @ 47-53 Hz

Maximum power consumption of the IND9R86 is 300 W.

Environmental Requirements

Operating and storage environments are as follows:

Operating temperature range	-10° C- +40° C
Storage temperature range	-20° C - +60° C
Relative Humidity	10-95%, non-condensing

The IND9R86 enclosure is protected to IP54 standard.

Mounting Location Requirements

The following restrictions should be taken into account when specifying the IND9R86 mounting location:

- Maximum length of the cable connecting IND9R86 with the load cells is 275 m for standard equipment, 100 m for the explosion hazard construction.
- The IND9R86 is not intrinsically safe and should not be installed in areas classified as hazardous.

Mounting the Controller

WARNING! / AVERTISSEMENT !

HARDWARE CONNECTION AND EQUIPMENT SETUP SHOULD BE CARRIED OUT ONLY BY QUALIFIED PERSONNEL OR METTLER TOLEDO AUTHORIZED REPRESENTATIVES. THE WARRANTY BECOMES NULL AND VOID IF REPAIR OR ADJUSTMENT IS MADE BY NONAUTHORIZED PERSONNEL.

EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILURE TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

LE RACCORDEMENT DE MATÉRIEL ET L'INSTALLATION D'ÉQUIPEMENT DEVRAIENT ÊTRE EFFECTUÉS SEULEMENT PAR LE PERSONNEL QUALIFIÉ OU LES REPRÉSENTANTS AUTORISÉS PAR METTLER TOLEDO. LA GARANTIE DEVIENT NULLE SI LA RÉPARATION OU L'AJUSTEMENT EST FAITE PAR PERSONNEL NON AUTORISÉ.

FAITES ATTENTION EN FAISANT LES CONTRÔLES, LES ESSAIS ET LES AJUSTEMENTS QUI DOIVENT ÊTRE FAITS QUAND L'IND9R86 EST ALIMENTE. NE PAS RESPECTER CES CONSIGNES PEUT ENTRAÎNER DES BLESSURES ET/OU DES DOMMAGES MATÉRIELS.

The standard construction of the IND9R86 is intended for wall mounting. The enclosure should be attached to the wall using the mounting brackets supplied with the device (Figure 4-1, left). First, the brackets are attached to the enclosure, two at the top and two at the bottom. The assembly is then mounted to the wall (Figure 4-1, right), as described in the following sections.

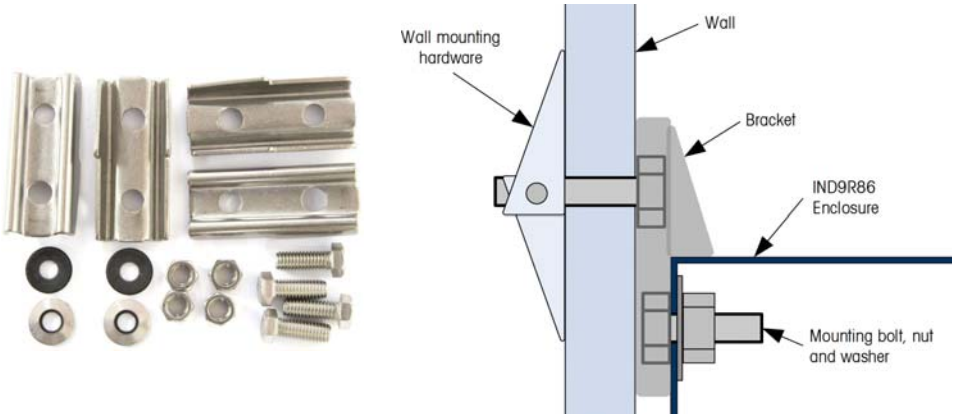


Figure 4-1: Wall Mounting Bracket Kit (left) and Mounting Method (right)

The IND9R86 is designed to mount on a flat surface, either vertically or horizontally. Depending on the surface to which it is mounted, fasteners may include wood screws, concrete wall anchors and dry-wall anchors.

Preparation for Mounting

To prepare the IND9R86 for wall mounting, follow these steps:

- Mark attachment points
- Install brackets on enclosure
- Install mounting hardware
- Attach enclosure to mounting hardware

With the brackets attached to the enclosure, use the assembly as a template to mark the position of the mounting holes on the mounting surface. Center to center, mounting holes should be spaced 16.5 in. (419mm) horizontally and 25.5 in (649mm) vertically.

Once the mounting hole positions are established, perform one of the following procedures, depending on the type of wall surface.

Note: The hardware to mount the terminal to the vertical surface is not included with the terminal – it must be supplied locally. Ensure that the mounting hardware is capable of supporting the weight of the terminal, which is approximately 46 lb (21 kg).

⚠ CAUTION! ATTENTION !

WHEN CARRYING OUT THE FOLLOWING PROCEDURES, WEAR PROPER BODILY PROTECTION, SUCH AS APPROVED SAFETY GOGGLES, EAR PROTECTORS AND GLOVES.

EN SUIVANT LES PROCÉDURES DECRITES ICI, PORTEZ LA PROTECTION CORPORELLE APPROPRIÉE, TELLE QUE LES LUNETTES DE SÛRETÉ, LES PROTECTEURS AURICULAIRES ET LES GANTS APPROUVÉS.

Wall Mounting, Concrete and Cement Blocks

When mounting the IND9R86 to a cement block, poured concrete or similar wall, the recommended mounting bolt is:

- UL-listed concrete sleeve anchor, size 1/4″ (6 mm), minimum embed 1/2″ (12.7 mm), minimum pullout force of 500 lb (266 kg).

Figure 4-2 shows an example of mounting hardware.

Figure 4-2: Sample Mounting Hardware, Concrete or Cement

1. Drill a hole through each of the measurements/locations you marked in the Preparation for Wall Mounting section. Use a carbide bit conforming to ANSI B94, 12-77 with the same size bit as anchor diameter (typically 5/16″ [8 mm]). The depth of the hole should be deeper than 1/2″ (12 mm).
2. Clean the holes with a wire brush.
3. Make sure the head of the bolt is flush with the top threaded part of the anchor then insert the anchor assembly through the bracket's mounting hole and into the base material.
4. Push anchor assembly until washer is snug against the wall.
5. Tighten each bolt with a wrench (use a screwdriver for flat/round heads), approximately three or four full turns or until anchor is tightly secured to the base material.

Wall Mounting, Wood Surface

When mounting the IND9R86 to a wooden wall or similar surface, use four #12 screws of at least 1 1/4″ (30 mm) length, each with a flat washer of minimum 1/2″ (12 mm) diameter.

Install the brackets on the enclosure.

Install a screw, with washer, through each of the four bracket mounting holes.

Periodically inspect the enclosure to insure that it is securely anchored to the wall. If not, retighten the mounting anchor bolts.

Positioning Terminal on Fasteners

Place the holes in the terminal flanges over the fasteners, and slide the terminal down firmly so that each fastener and washer engages the slots in the flanges.

For wallboard or drywall mounting, after engaging the flanges pull them away from the wall until the toggle nuts are felt to contact the inside of the wall. If necessary, unmount the terminal and tighten the bolts slightly. Figure 4-3 shows the relationship between flange, hardware and wall.

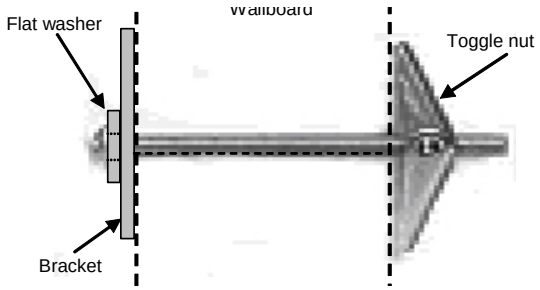


Figure 4-3: Wallboard or Drywall Installation

Periodically inspect the terminal to insure that it is securely anchored to the wall. If not, remove the terminal and retighten the mounting anchor bolts.

Connections

External Ports

The IND9R86's industrial PC is equipped with the following ports, indicated in Figure 4-4.

- 2 RJ45 Ethernet
- 4 USB 2.0 (via a powered USB hub, mounted below the Ethernet switch)

The IND9R86 is configured with drivers for an Okidata 320i printer, connected via USB. Contact Mettler Toledo for further options. To change the printer setup, adminstrator access to the Windows operating system is necessary.

Figure 4-4: Ethernet (left) and USB (center) Ports on the Industrial PC and Print Server/Ethernet Switch (right)

COM Ports

The IND9R86 is equipped with four serial COM ports, each of which requires a 9-pin female D-sub connector. Optical isolation is recommended for any serial port that addresses a device outside the IND9R86 enclosure.

COM1 - 4

Pin-outs for COM1 (RS-232) are as follows:

Pin	Function
2	RS-232 RxD
3	RS-232 TxT
5	GND

Wheel Detectors and Wheel Detector Interface Module

The IND9R86 may be configured with 4, 6 or 8 wheel detectors. The wheel detector interface module is configured according to the number of wheel detectors specified, and its terminals should be connected as described below, depending on system configuration. Figure 4-5 shows a dual wheel detector bracket assembly.

Figure 4-5: Wheel Detectors Mounted on Bracket

Wheel Detector Connections

Each Wheel Detector is connected to the Wheel Detector Interface Module by two wires – one to the detector's dedicated terminal, the other to the isolated common terminal. Wheel Detectors are wired internally as seen in Figure 4-6: the blue (isolated common) to terminal 3, the clear (Wheel Detector Interface) to terminal 4.

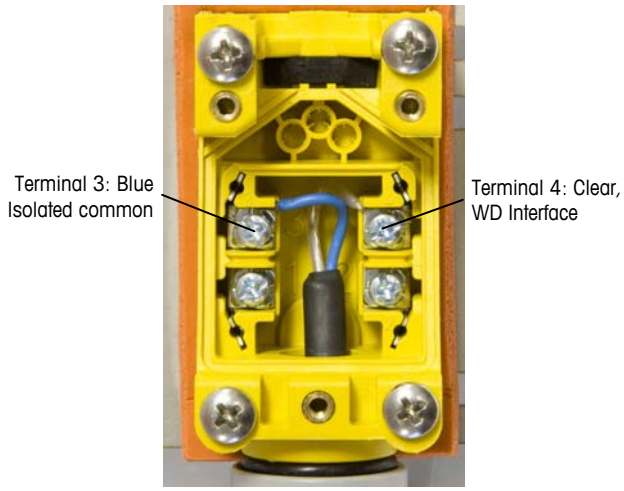


Figure 4-6: Wheel Detector Wiring

Wheel Detector Interface Module Connections

The wheel detector interface module has eight terminals, labeled 0 through 7, and a common +24 VDC terminal, as indicated in Figure 4-7. The first two wheel detectors should be connected to terminals 0 and 1, the next two to terminals 2 and 3, and so on (Table 4-1).

Figure 4-7: Wheel Detector Interface Module Terminals

Table 4-1: Wheel Detector Connections

# of Wheel Detectors	Interface Module Terminals Connected
4	0, 1, 2, 3
8	0, 1, 2, 3, 4, 5, 6, 7,

Power Connector Wiring

The IND9R86 requires a properly grounded power supply of 115 or 230 volts AC. Connect the power supply cable incoming power terminal block, at lower left inside the controller's enclosure. Consult the wiring diagram supplied with the IND9R86.

Note: The use of an on-line uninterruptible power supply is strongly recommended (reference MT part # 90818800D).

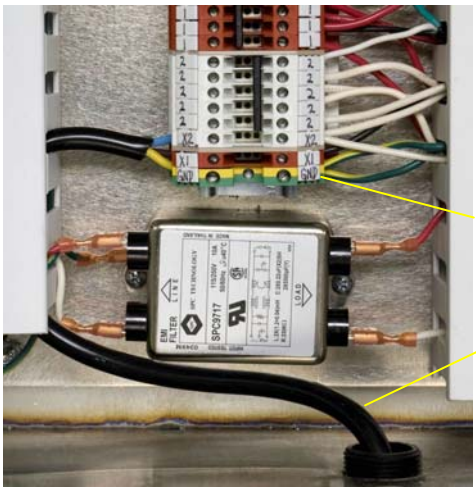


Figure 4-8: AC Power Connection

Metrological Sealing

The metrological sealing method depends on the weighing terminal used. Refer to the terminal-specific technical documentation provided on the documentation CD-ROM.

The IND9R86 enclosure is sealed using a wire seal threaded through holes in the lower right corner of the enclosure and of the front door.

Lightning Protection

Refer to Mettler Toledo drawing # for recommended lightning protection for the weighing system. A Mettler Toledo TB100439 transient surge voltage protector is recommended for use with the incoming AC power line.

Wheel Detector Layout

A typical dual wheel detector installation is shown in Figure 4-9.

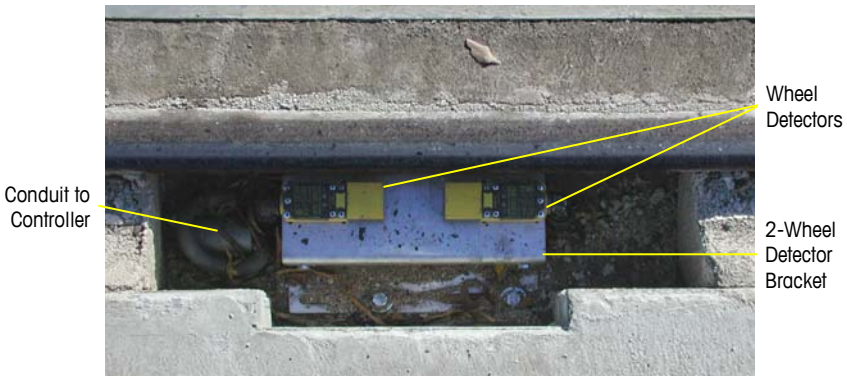


Figure 4-9: Dual Wheel Detector

The two pairs of wheel detectors are positioned 88″ apart, each an equal distance from the center point of the scale platform:

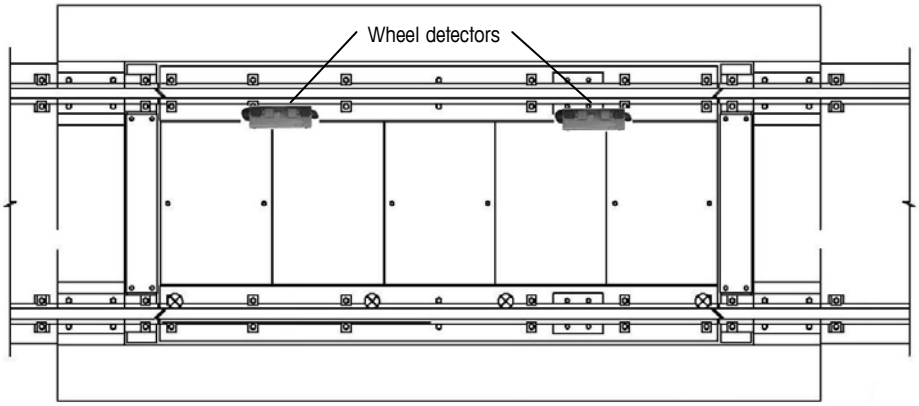


Figure 4-10: Wheel Detector Layout

CIM Conduit Layout

The drawing in Figure 4-11 (on the following page) shows a typical layout for the cable conduits associated with the train weighing system. Refer to Mettler Toledo drawing # 912225R for further details.

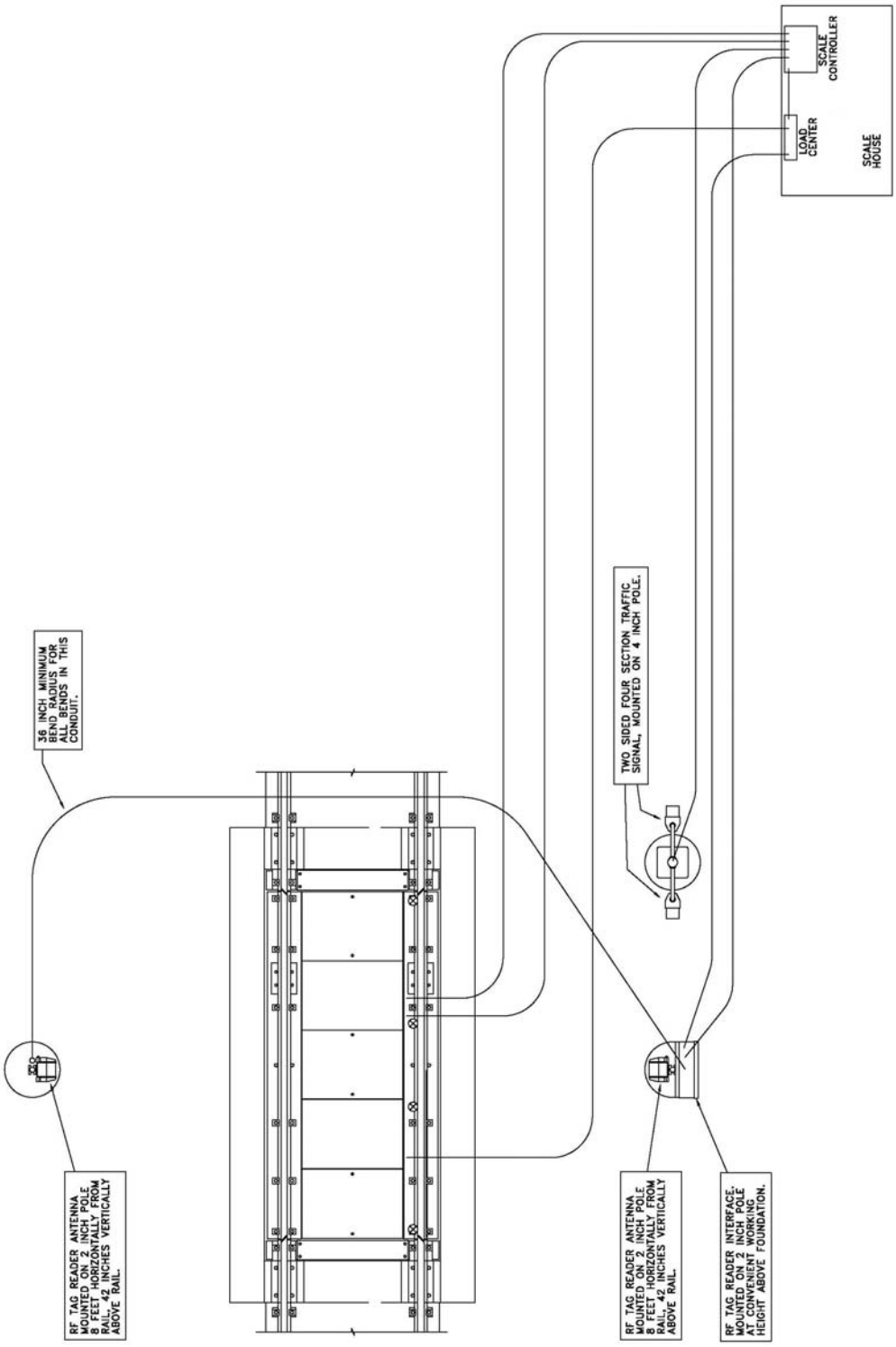


Figure 4-11: CIM Conduit Layout

Chapter 5.0

Service and Maintenance

This chapter covers
- Introduction
- Routine Maintenance
- Troubleshooting
- Service and Repair

Introduction

This chapter provides instructions for maintaining, troubleshooting and servicing the IND9R86 weighing controller.

Routine Maintenance

The IND9R86 Weighing Controller requires no special care. Its maintenance consists only in cleaning its surfaces and checking proper connection of cable connections.

Troubleshooting

Problem	Possible Cause/s	Corrective Action
Weight display shows ------	Scale platform communication error	Use diagnostic mode and/or InSite™ tool.
	Problem with physical connections	Check connections and cables; repair/replace as necessary.
Wheel detector/s do not detect wheels, WD counts don't increment	Faulty wheel detector and/or connection/cabling.	Check wheel detector and cabling.
Wheel detector/s activation too brief (<100 mSec at train speed of 5 mph/8 kph)	Detector bracket/s bent or misaligned; train moving too fast.	Repair/replace as necessary. Run train at correct speed Adjust WD activation threshold value.
Error message appears on external monitor	Note: Windows pop-ups stop the weighing application.	Re-start application.
No AEI tag recorded while train in transit	Tag missing; AEI reader faulty or misaligned.	Check AEI reader.

Service and Repair

⚠ WARNING! / AVERTISSEMENT !

EQUIPMENT REPAIR SHOULD BE CARRIED OUT ONLY BY QUALIFIED PERSONNEL OR METTLER TOLEDO AUTHORIZED REPRESENTATIVES. THE WARRANTY BECOMES NULL AND VOID IF REPAIR OR ADJUSTMENT IS MADE BY NONAUTHORIZED PERSONNEL.

LE RACCORDEMENT DE MATÉRIEL ET L'INSTALLATION D'ÉQUIPEMENT DEVRAIENT ÊTRE EFFECTUÉS SEULEMENT PAR LE PERSONNEL QUALIFIÉ OU LES REPRÉSENTANTS AUTORISÉS PAR METTLER TOLEDO. LA GARANTIE DEVIENT NULLE SI LA RÉPARATION OU L'AJUSTEMENT EST FAITE PAR PERSONNEL NON AUTORISÉ.

A list of available spare parts is provided in Appendix D of this manual.

Appendix A

System Messages

The following table lists and explains messages an operator may encounter during normal system operation. Where appropriate, action/s the operator should take in response to the message are specified.

Message	Interpretation
Automatic Weighing Stopped	ESC has been pressed and the system has entered Stand-by mode.
Automatic Weighing Started	Either the system has completed initializing, or ENTER has been pressed in Stand-by mode. This message displays briefly.
Weighing Train #NNNNN	Displays when Automatic Weighing is underway.
Processing Suspended	Editing of train data underway. Processing of new trains is suspended until editing is completed.

Appendix B

System Settings

IND9R86-specific Terminal Settings

This section is provided for recording, during setup, of site-specific settings for the weighing terminal (IND135, IND560, IND780) included in the IND9R86 controller.

Terminal:	
Setup Feature	**Terminal Setting**

Appendix C

Operating System Notes

The IND9R86 uses a Windows™ XP operating system. All settings for PC to device communication are made by accessing Windows' setup utilities.

Remote desktop must be enabled to permit operation, configuration and data retrieval from an external PC.

Windows **System Restore**, system pop-ups and **Automatic Updates** are disabled.

Shutting Down the Application

A numeric password, set in the separate IND9R86 Configurator, is required to exit the train weighing application. It is not necessary to exit the application in order to export or print reports – ALT-TAB permits access to the Windows desktop where these functions can be performed.

Appendix D

Spare Parts and Accessories

Spare Parts List

The following spare parts may be ordered from METTLER TOLEDO:

Part Number	Item
64053820	Power supply,24V,1A,85-265V
907395060	Circuit Breaker, 6A, DIN rail
90793100A	Output Module, 12-280 VAC
91101600A	Black Pushbutton
91132300C	Power supply,5V, 6A
91138600A	8-channel Wheel Detector Interface PCB Assembly
91141900A	Harness,4X20 LCD display
91142700A	Kit, USB Logic I/O
91143000A	Harness, Logic I/O
91143400A	PC assembly
91143700A	Programmed Compact Flash, IND9R86, Windows XP
91152500A	Spare Wheel Detector (sensor only)
91193300A	Lens,240X64 LCD display
91193400A	Gasket,240X64 LCD display
91195400A	Display,240x64 LCD,serial in
91241000A	Ethernet switch/print server, DIN rail
91218200A	2-channel RS-232 Isolator
91154800A	Wheel detector kit including cable, no bracket
91224200A	Wheel detector bracket only for dual wheel detector applications
91225800A	Cable Assembly, DBF9

Accessories

The following IND9R86 accessories are available from METTLER TOLEDO:

Part Number	Item
64056504	Wheel detector shielded cable, 2-conductor, for single wheel detector, per foot
90429300A	Stainless steel junction box for 4 wheel detectors
90429400A	Stainless steel junction box for 2 wheel detectors
90818800D	On-Line UPS, 1000VA, 800W, 115VAC
90893100A	6' pole mount kit for AEI reader
91022700A	LCD Flat Screen Monitor, 17"
64058814	USB QWEWRTY keyboard
90761700A	USB/Parallel printer
91063900A	Wireless communication kit, 802.11g, with antenna and grounding kit
91105500A	Dial in ethernet router
91223500A	On-Line UPS, 1000VA, 800W, 230VAC
91224100A	STC AEI Kit, dual antenna and grounding kit
91235800A	Radio Talker Overspeed Interface Assembly
909085008	75 foot cable w/ connector for SmartPass AEI Reader
909086104	Transcore, High power AEI reader for half & full frame tags, RS232/Wiegand
909089110	Transcore full-frame, metal mount transportation tag, beam, 915 MHz
Inquire	PLC Option - Software program to send in-motion weight to PLC

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240

64064897