User Guide

ACT350 Precision

Weight Transmitter User Guide

METTLER TOLEDO

ACT350 Precision Transmitter

METTLER TOLEDO Service

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    d. **GWP® Verification**: A risk-based approach for managing weighing equipment allows for control and improvement of the entire measuring process, which ensures reproducible product quality and minimizes process costs. GWP (Good Weighing Practice), the science-based standard for efficient life-cycle management of weighing equipment, gives clear answers about how to specify, calibrate and ensure accuracy of weighing equipment, independent of make or brand.

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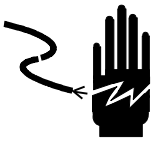
THE ACT350 Precision IS INTENDED TO BE USED FOR PROCESS CONTROL AND IS NOT APPROVED AS A SAFETY COMPONENT. WHEN USED AS A COMPONENT PART OF A SYSTEM, ANY SAFETY CIRCUITS MUST BE INDEPENDENT OF THE ACT350 AND REMOVE POWER FROM THE ACT350 OUTPUTS IN THE EVENT OF AN EMERGENCY STOP OR EMERGENCY POWER DOWN.

⚠ WARNING



ONLY USE RECOMMENDED 24 VDC POWER SUPPLY APPROVED AS NEC Class 2 OR RATED AS LIMITED POWER PER IEC60950-1.

⚠ WARNING

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.

⚠ WARNING

ONLY THE COMPONENTS SPECIFIED ON THE ACT350 Precision DOCUMENTATION MEDIA CAN BE USED IN THIS TRANSMITTER. ALL EQUIPMENT MUST BE INSTALLED IN ACCORDANCE WITH THE INSTALLATION INSTRUCTIONS DETAILED IN THE USER'S GUIDE. INCORRECT OR SUBSTITUTE COMPONENTS AND/OR DEVIATION FROM THESE INSTRUCTIONS CAN IMPAIR THE SAFETY OF THE TRANSMITTER AND COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ WARNING

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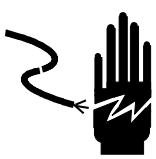
⚠ WARNING



INSTALLATION AND ANY SERVICE ON THIS EQUIPMENT MUST BE DONE ONLY AFTER THE AREA IS SECURED AS NON-HAZARDOUS BY THE RESPONSIBLE PERSON ON-SITE AUTHORIZED TO DO SO.

⚠ WARNING

THE ACT350 Precision IS NOT INTRINSICALLY SAFE! DO NOT USE IN HAZARDOUS AREAS CLASSIFIED AS DIVISION 1 AND DIVISION 2, ZONE 0, ZONE 20, ZONE 1, ZONE 2 OR ZONE 21 BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.

⚠ WARNING

ONLY 24VDC POWER SUPPLY IS AVAILABE TO CONNECT WEIGHT MODULES / SCALES TO ACT350 Precision. ALL OTHER WEIGHT MODULES REQUIRE AN EXTERNAL POWER SOURCE. CONFIRM VOLTAGE BEFORE USE!

NOTICE

DO NOT ACTIVATE POWER OVER ETHERNET (PoE) ON ETHERNET SWITCHES ON THE ACT350 Precision NETWORK. ACTIVATING PoE MAY RESULT IN DAMAGE TO THE ACT350 Precision TRANSMITTER.

NOTICE

IN ORDER TO ENSURE PROPER DISSIPATION OF HEAT FROM THE TRANSMITTER'S PCBS, AND TO AVOID DAMAGE TO THE EQUIPMENT, THE ACT350 MUST BE MOUNTED VERTICALLY, ON A HORIZONTAL DIN RAIL.

NOTICE

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

Disposal of Electrical and Electronic Equipment

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.

Contents

1 Introduction

The ACT350 Precision represents the latest in METTLER TOLEDO technology and is one of the most versatile weighing transmitters available today for Precision weighing technology. The factory pre-configured PLC communication interface in a DIN rail mounting scheme makes the ACT350 Precision a perfect match for machines systems requiring the highest level of accuracy. The ACT350 Precision delivers highest accuracy, precise measurement data in grams and kilograms in a single cost-effective package that easily integrates into control panel systems.

The versatile ACT350 Precision excels in controlling simple filling and dosing applications, and delivering best-in-class performance for precise, accurate results in fully automatic operations. Utilize the control capabilities of the ACT350 Precision to effectively manage project costs.

1.1. Inspection and Contents Checklist

Verify the contents and inspect the package immediately upon delivery.

The package should include:

- ACT350 Precision transmitter
- Safety warnings in multiple languages
- Parts for installation, including EMC magnetic ring and connectors,

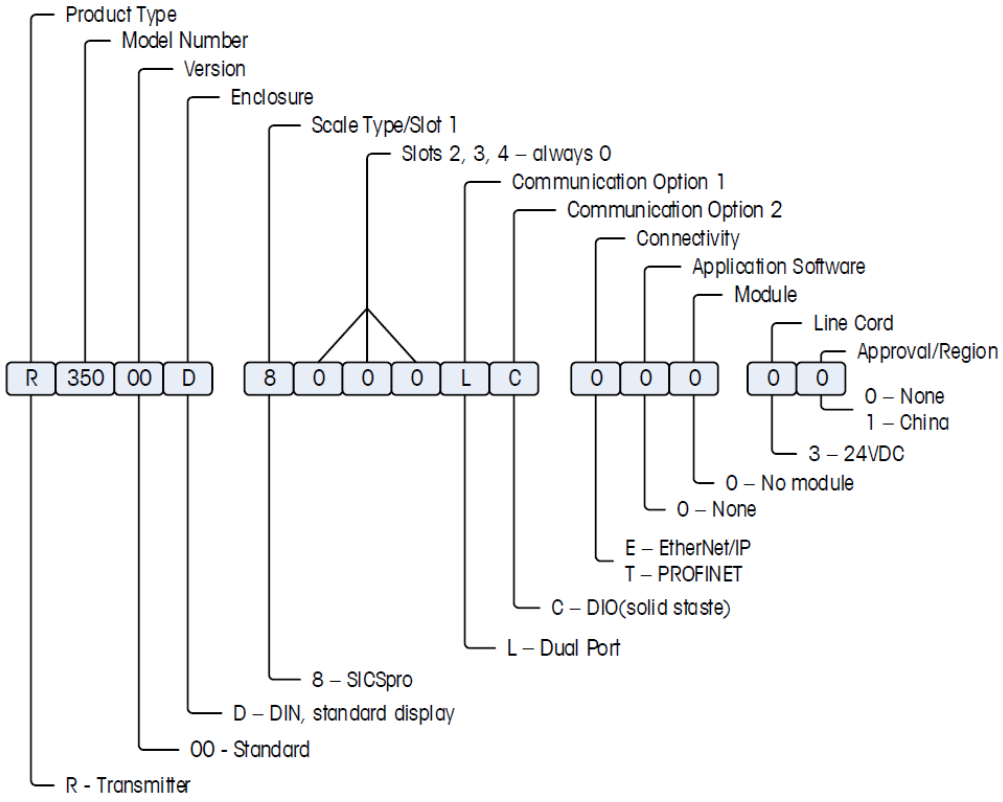
Figure 1-1 ACT350 Precision Delivery Scope

NOTICE

All relevant documentation, software, fieldbus files and sample codes are available at **www.mt.com/ind-act350-downloads**.

1.2. Model Identification

The ACT350 Precision model number is located on the data plate on the back of the transmitter along with the serial number. Refer to **Figure 1-2** to identify the ACT350 Precision configuration.



Item Number	Description / SKC Number	Version	Fieldbus Type
30476263	WEIGH TRANSM PRNT R35000D8000LCT0030	ACT350 Precision	PROFINET
30476264	WEIGH TRANSM ETIP R35000D8000LCE0030	ACT350 Precision	EtherNet/IP

Figure 1-2: ACT350 Model Identification Numbers

1.3. Versions of PLC Interfaces

The ACT350 Precision comes factory-configured with PLC interface options including

- **EtherNet/IP**
- **PROFINET**

Each product version is specific to the PLC interface and cannot be changed to a different fieldbus type.

The ACT350 Precision uses the Standard Automation Interface (SAI) protocol as the communication protocol with the PLC.

NOTICE

PLC Device Description Files as well as **PLC Sample Code** are available at
www.mt.com/ind-act350-downloads.

1.4. Physical Dimensions

All available types of ACT350 Precision have the same physical dimensions of the enclosure. An example of the ACT350 Precision enclosure is shown in Figure 1-3: ACT350 Precision Panel Mount Enclosure Dimensions

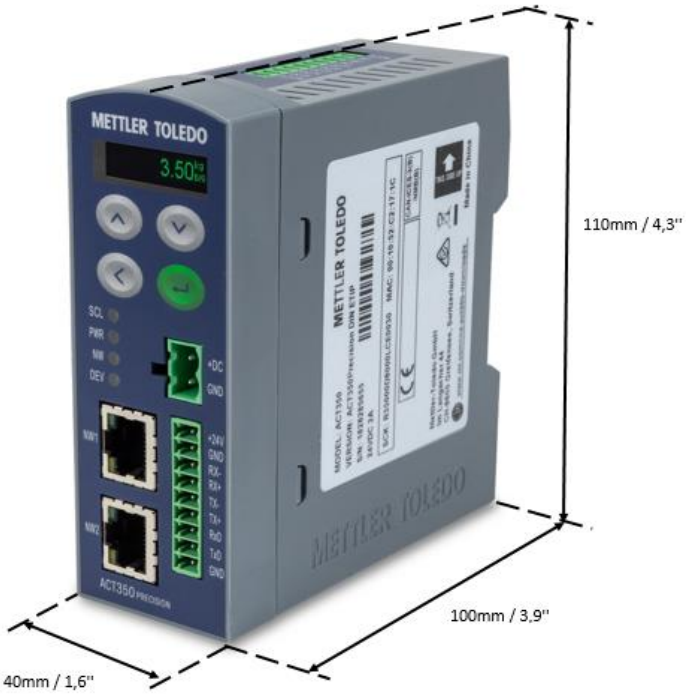


Figure 1-3: ACT350 Precision Panel Mount Enclosure Dimensions – relevant to all models

NOTICE

2D and 3D drawings available at www.mt.com/ind-act350-downloads

2 Operation

2.1. Front Panel

An example of the ACT350 Precision front panel is shown in

Figure 2-1: ACT350 Front Panel Layout.

ATTENTION
Weigh Modules or Scales powered by 12VDC should be supplied using an external power source.

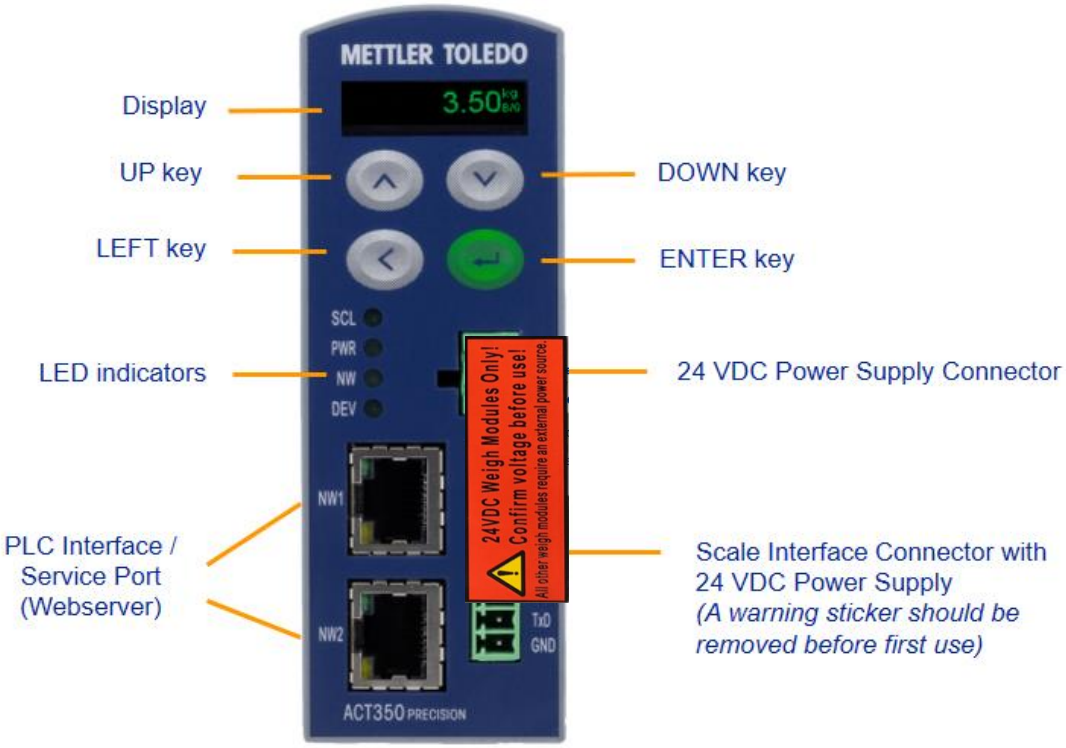


Figure 2-1: ACT350 Front Panel Layout

ATTENTION

Weigh Modules or Scales powered by 12VDC should be supplied using an external power source.

2.1.1. Display Layout

The ACT350 Precision transmitter has an organic LED (OLED) display, 128 × 32 dot matrix graphic type display. The display is reserved for scale weight, units, Net/Gross indicator and error messages.

Additional information provided includes:

- Weight unit (lb, kg, g)
- Motion / no-motion condition
- Gross or net mode

Figure 2-2 Display in Weighing Mode

2.2. Front Panel Keys

Four dedicated function keys are located on the front panel to support manual setup configuration. These provide the interface to navigate the setup menu hierarchy and data entry, as well as make setup selections within data entry and drop down boxes.

	**ENTER**	Press the ENTER key for 3 seconds to access the device menu. Press the ENTER key to make a selection from the device menu and sub-menus. When in a data entry field, press the ENTER key to accept the numeric value entered.
	**UP**	Press the UP key to scroll within the device menu and sub-menus. The UP key is also used for incrementing numerals in the numeric data entry field.
	**DOWN**	Press the DOWN key to scroll within the device menu and sub-menus. The DOWN key is also used for decrementing numerals in the numeric data entry field.
	**LEFT**	Press the LEFT key to navigate up one step on the device menu tree. The LEFT key is also used to scroll to the numeral to the left in a data entry field. With the left most numeric character highlighted, the next key press will wrap around to the right most numeral.

2.3. LEDs Status

Normal Work	Network Error *(Example)*	LED	STATUS
		SCL	Scales status: ON okay, flashing indicates scale error
		PWR	Power status: ON okay, OFF error
		NW	The NW light is solid only when cyclic communication with the PLC is available. Without PLC cyclic communication, the NW LED will be flashing.
		DEV	Device Status: ON okay; flashing contact service

2.4. ACT350 Precision Device Main Menu

From the front panel, press and hold the ENTER key for 3 seconds to access the device menu. The display will change from showing the normal weight display to showing the Information Recall icon. Press the UP or DOWN keys on the front panel to display icons for the various functions listed in

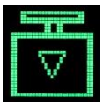
	**Information Recall**	Recall mode for most transmitter information fields.
	**Comparators**	Access to the limit value for all comparators.
	**Calibration**	Access to calibration menu including Test and adjustment (This is only available after successfully connect to Weigh Module)
	**Error Message**	Access to list of current error messages
	**Language**	Selects between English and Chinese
	**Setup**	Access to all setup parameters for the transmitter.

Table 2-1: Device Menu Icons

Once a field value is in focus, repeated presses of the UP, DOWN or LEFT keys will cycle back to the beginning, so if the LEFT key is pressed when focus is in the left-most position, focus returns to the right-most position. In the case of the UP and DOWN keys, the numerical value will cycle through numerical values and the decimal point as follows:

0 > 1 > 2 > 3 > 4 > 5 > 6 > 7 > 8 > 9 > - > . 0 > 1 > …

0 > . > - > 9 > 8 > 7 > 6 > 5 > 4 > 3 > 2 > 1 > . > …

After accepting the value by pressing ENTER and the focus has moved to the parameter description, press the LEFT key to exit to the next higher level of the menu.

Pressing the LEFT multiple times will exit the device menu.

Figure 2-3 shows an example of how to access and modify the value of a parameter. The currently selected item (in focus) is indicated by reverse video.

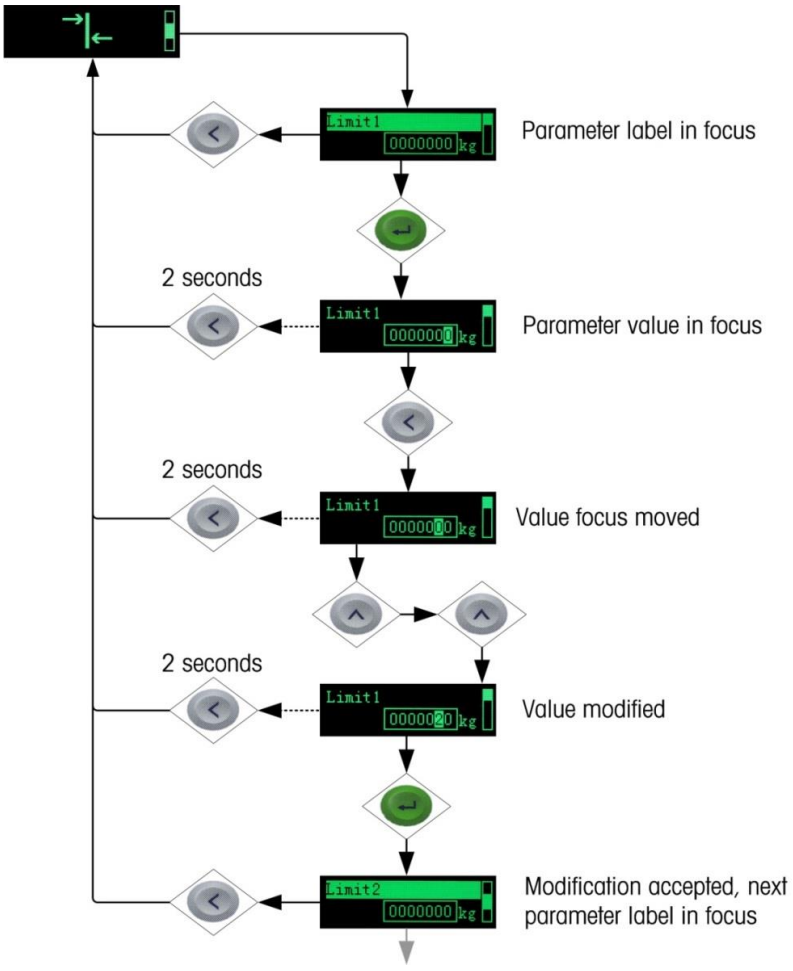


Figure 2-3: Numerical Data Entry Example

2.4.1. Information Recall

Once the Information Recall icon appears, press the ENTER key to recall specific information about the transmitter.

Figure 2-4 shows the elements of the Information Recall menu in the sequence in which they occur. Note that some items may not appear, depending on the configuration of the transmitter.

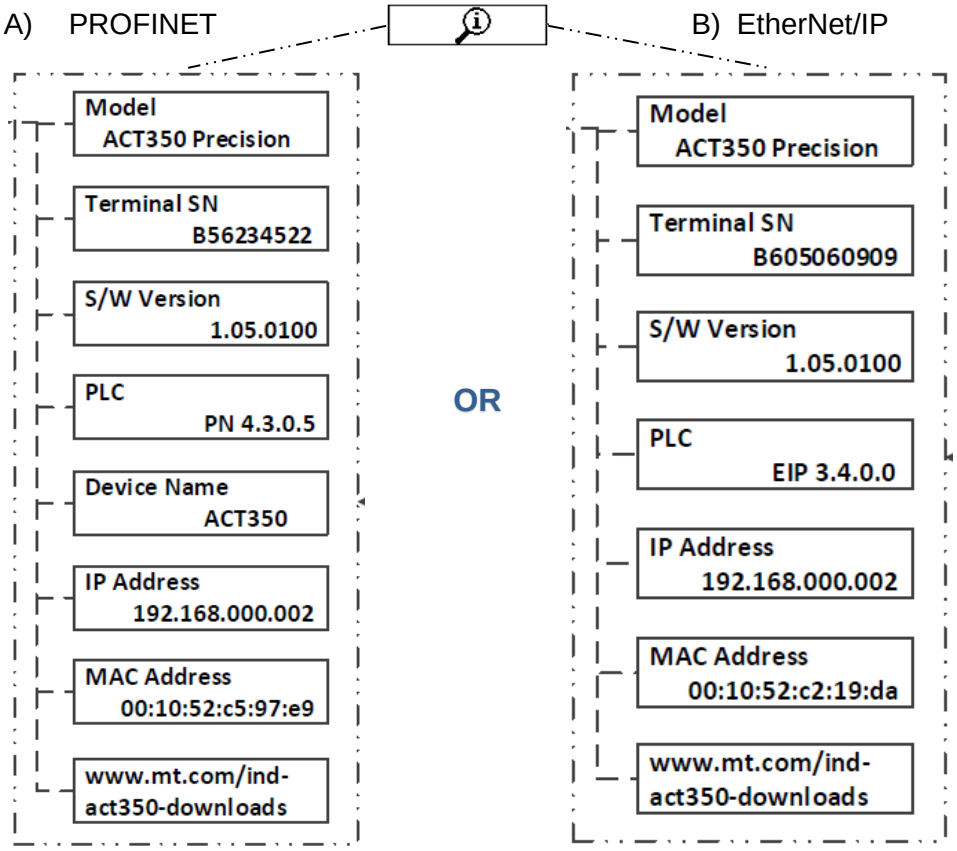


Figure 2-4: Information Recall Menu for PROFINET (A) and EtherNet/IP (B) version

2.4.2. Comparators

The device supports a total of five comparators. One, two and up to five comparators may be used. The limit of each comparator may be modified by accessing the Comparator menu in the setup menu. Comparator values are limited to 7 digits, and can be written to the device or read from it by the PLC.

2.4.2.1. Setting Comparators

Access the Comparator menu by pressing the ENTER key when the transmitter's device menu is visible and the →|← icon is displayed on the device. The Figure 2-5 present setting the comparators. Please note that Comparators must be enabled in the webserver in order to access this menu.

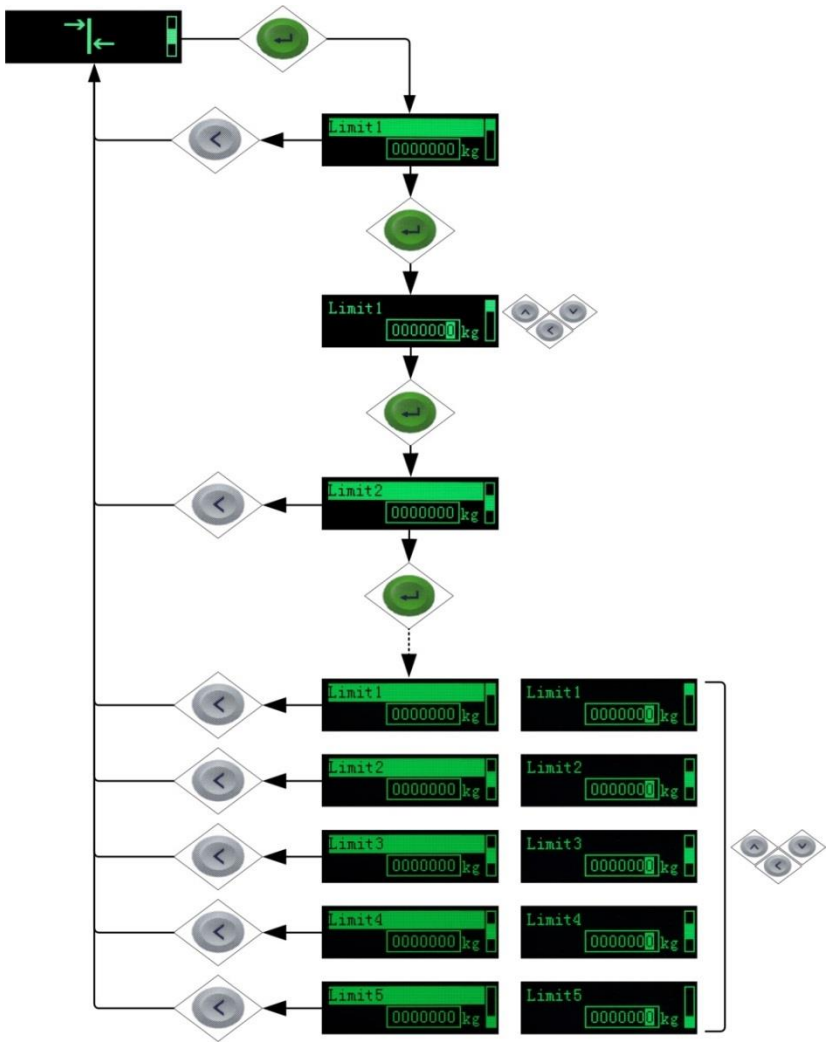


Figure 2-5 Setting Comparators

Only one limit value can be set for the comparator. Pressing the ENTER key again returns to the list of comparators. If the operator is a range, then the Limit screen is followed by the High Limit screen, from which the ENTER key exits back to the list of comparators. To edit parameters other than limits, Comparator configuration must be accessed in setup. Refer to the Numerical Data Entry section for the method used to modify numerical values.

When the weighing platform value is greater or equal to the target value, the comparator output status is valid (TRUE), otherwise it will be invalid (FALSE).

2.4.3. Calibration

Calibration is the process of adjusting the display of the transmitter so that when the scale is empty, the display shows zero gross weight and with a specific amount of weight on the scale, it also shows an accurate weight value.

The calibration menu of the ACT350 Precision transmitter is used to send commands that trigger the weigh module to test or adjust, so the actual calibration process takes place on the weigh module.

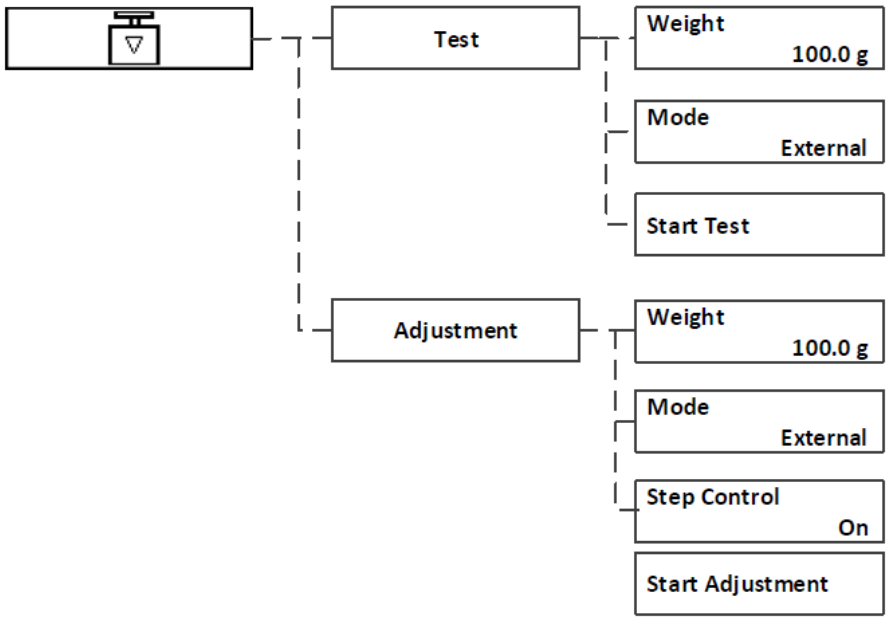


Figure 2-6: Calibration Menu – Overview

Access to the Calibration menu using the device's front panel is accomplished by pressing the ENTER key when the icon is displayed on the device. The Calibration menu can also be accessed using the PC-based Webserver Configuration Tool.

NOTICE

The Calibration is available only when the ACT350 Precision is connected to the Weight Module. When disconnected the mode is disabled.

2.4.3.1. Test

The Test menu is mainly used to detect whether there is a deviation between the current weighing result of the weighing module and the standard weight.

It can be divided into internal and external tests. The difference is that the internal test uses the weight built in the weighing module, and the external test needs the user to load the standard weight.

2.4.3.2. Test Mode

Take the external test as an example. First, click the OK button to start the test process. Enter the weight of the loaded weight in the input box. Click the down button and the confirm button to start the test process.

Follow the on-screen prompts to complete the test.

2.4.3.3. Adjustment

The calibration method for the weighing module is also divided into internal and external, and its meaning is the same as the test: the internal calibration uses the weight built in the weighing module, and the external calibration needs the user to load the standard weight.

Compared with the Test, Adjustment has one additional control option: Step Control. Take the external calibration as an example again. When the single-step control is enabled, the user needs to manually confirm the external standard weight by pressing the enter key.

ATTENTION

Depending on which kind of weighing module is connected, the adjustment settings will automatically conform to the settings of the weigh module

2.4.4. Error Message

With the Errors icon in view, press the ENTER key to access a listing of current error messages.

Table 2-2: ACT350 Precision Faults

Error value	ACT350 Precision Display	Description	Action
002	"Calib. In process"	Remote Calibration(via WebServer) is in process	No actions, allow calibration process to finish.
005	“NW Module init. fail”	Hardware for PLC communication initialization fail	Cycle power; call service if issue persists
006	“PLC connection disconnected”	Lost connection to PLC	Check cable or connector. If problem persists, re-establish communications to PLC
009	“Board info. Err”	Hardware production information error	Cycle power; call service if issue persists
010	“Calib. Block err”	Calibration block data error; block data is lost	Perform master reset Re-calibrate
011	“Scale block err”	Scale block data error	Perform master reset Perform setup for scale block
012	“Term. Block err”	Transmitter block data error	Perform master reset Perform setup for transmitter block
013	“APP. Block err”	Application block data error	Perform master reset Perform setup for application block
014	“COM. Block err”	Communication block data error	Perform master reset Perform setup for communication block
015	“Maint. Block err”	Statistics block data error	Perform master reset Perform setup for maintenance block
020	“Zero failed/Out of range”	Weight out of zero range	Unload scale and perform Zero again
021	“Zero failed Zero disabled”	Zero attempted when function disabled in Setup menu	Enable Zero function in Setup menu
030	“Tare Failed, over capacity”	Tare failed due to scale being over capacity	Unload weight on scale until overcapacity is cleared and perform Tare again

034	"Tare failed"	Tare failed due to weight out of range or scale not stable or disabled Tare function	Confirm tare function is enabled or confirm weight is in tare range or allow weight to settle
038	"WM Supply Beyond Voltage"	Overvoltage of power supply for WM	Check the weigh module supply voltage that should be lower than 26.4V
039	"WM Supply Over Current"	Overcurrent of power supply for WM	Check the weigh module supply current that should be lower than 2000mA
043	" WM Communication Error"	Lost communication between WM and ACT350 Precision	Check the communication parameters and connection cables. Use the webserver to re-establish communication if necessary

2.4.5. Language

The ACT350 supports a device menu in **English** [default] and in Chinese.

2.4.6. Parameters Setup

The last icon displayed in the device menu from the front panel is Setup , where programming parameters of the transmitter can be viewed and modified.

ATTENTION

It is not intended that operators enter the setup mode after a weighing system is installed and is operational. It should not be necessary for an operator to access setup.

Following figure presents all available functions.

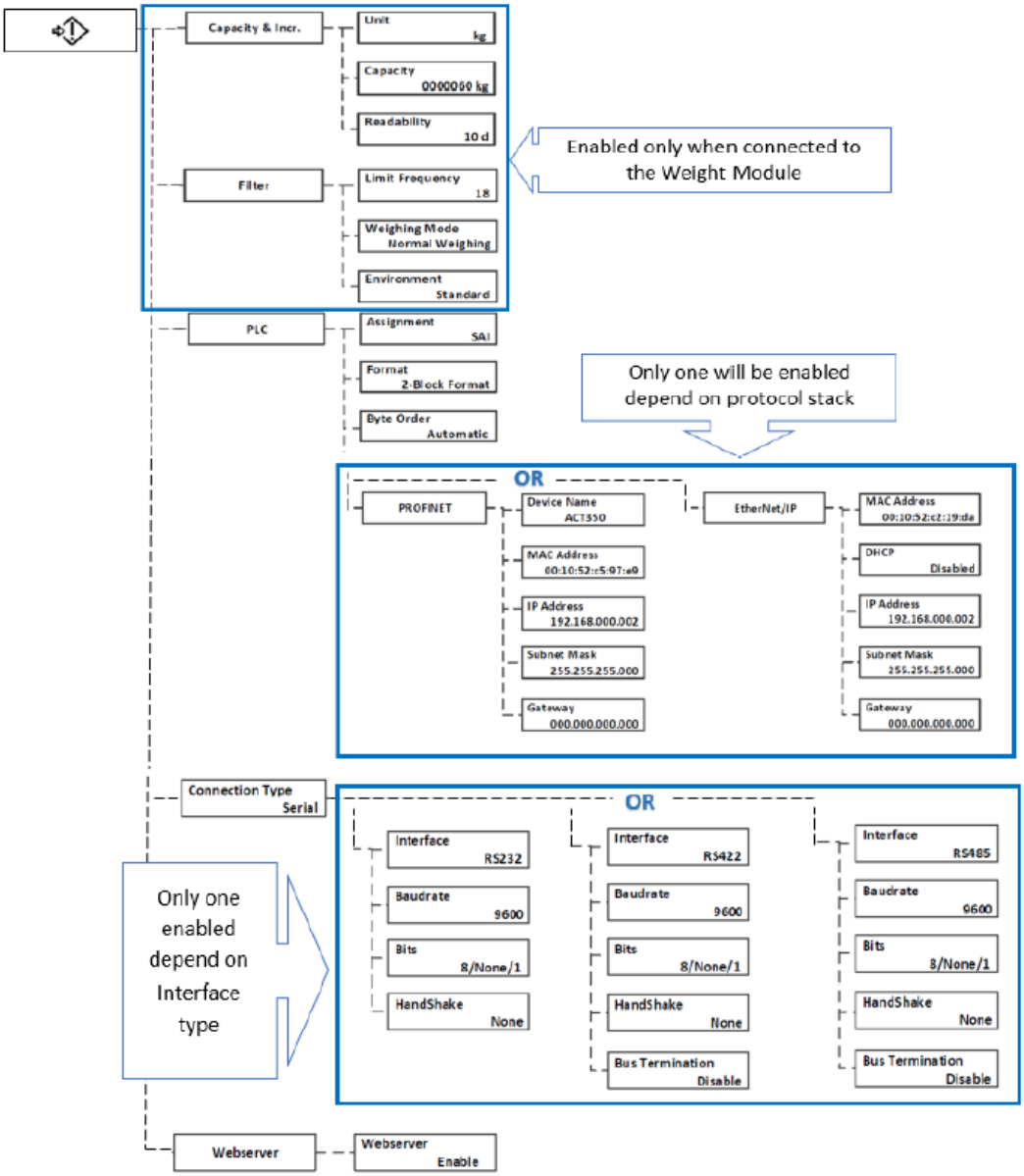


Figure 2-7: Device settings

2.4.7. Password Security

Note that a security password can be enabled in setup from the PC-based Webserver Configuration Tool. When a password is set, it must be entered to access setup. This protects the setup parameters from inadvertent changes.

To setup the password go to the webserver **Login -> Change Password** section where the protection should be enabled and enter your password. Each device originally uses **"000000"** as default password.

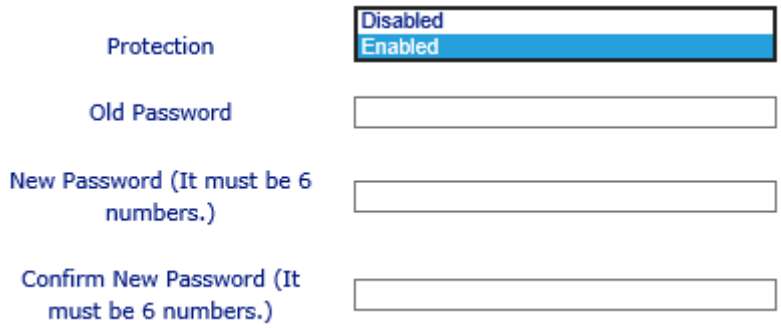


Figure 2-8: Password Entry Screen

A new password must be exactly 6 numbers in length. No letters or special characters can be used to enter a new password.

ATTENTION

Remember that if the password is lost, only a Master Reset can reset the password to the default "000000".

2.4.8. Master Reset

A master reset restores all settings to their factory default values:

Figure 2-9: DIP Switches

1. Remove power from the transmitter.
2. Set switch **2** to its ON position and restore power to the transmitter. The ACT350 Precision will prompt for confirmation.

Figure 2-10: Master Reset Confirmation

3. Press ENTER on the front panel to perform the master reset.
4. Set Switch **2** to OFF.

2.5. ACT350 Precision Basic Operation Functions

2.5.1. Zero

The Zero function is used to set or reset the initial zero reference point of the transmitter. There are two types of zero setting modes:

2.5.1.1. Green ENTER Button

The zero function can be accomplished by a short press of the green ENTER scale function key. If the current scale weight is outside the zero range when a pushbutton zero is commanded, the transmitter will display a message:

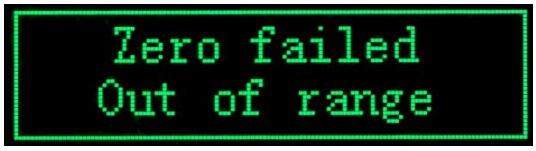


Figure 2-11: ENTER button Zero Failure Message

Remote initiation of the semi-automatic Zero command is possible via a command initiated by the PLC interface.

2.5.2. Tare

The tare value is subtracted from the gross weight measurement, providing the computation of the net weight (material without the container). The tare function can also be used to track the net amount of material being added to or removed from a vessel or container. In the second case, the weight of the material inside is included with the tare weight of the container and the display reflects the net amount being added to or removed from the vessel. Tare is captured and cleared by PLC command.

2.5.3. Filter

The Filter section offers three settings:

Limit Frequency	Selections from 1 to 20 in this drop-down box set the cut-off frequency, in Hertz, above which the filter actively attenuates the signal.
Weighing Mode	Sets the type of weighing, **Normal**, or based on the Weight Module Type available Modes, as the option for which the ACT350 Precision is being used in the current application.
Environment	Sets the type of environment in which the ACT350 Precision is working, depending on how stable the scale is likely to be.

3 Installation

3.1. Overview

The ACT350 Precision is usually installed in the control cabinet, where the rail mounting makes it easy to install.

The high-precision digital weighing module is connected directly to the ACT350 Precision, eliminating the need for a junction box. The weight data and status/diagnostic information are delivered via PROFINET or Ethernet/IP interface to the PLC.

Figure 3-1 presents the typical weighing system using ACT350 Precision.

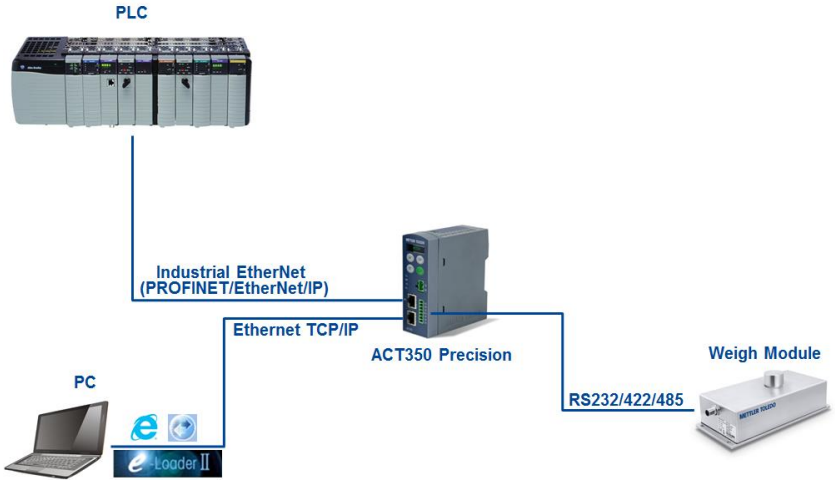


Figure 3-1 The typical ACT350 Precision weighing system

The high-precision weighing module is connected to the ACT350 Precision using the 9-pin interface on the front of the device.

The two RJ45 network interfaces can be used to connect to a PLC and/or a PC (Webserver – for product settings).

The integrated Webserver allows the user to configure the ACT350 Precision or connected Weigh Module.

The ACT350 Precision can also be connected to the Weighing Module for parameter setting and maintenance via the RJ45 interface of the ACT350 Precision using the APW-Link software.

3.2. Mechanical Installation

The ACT350 Precision mounts to a standard DIN rail. DIN mount includes an integral transmitter grounding system, visible in **Figure 3-2**.

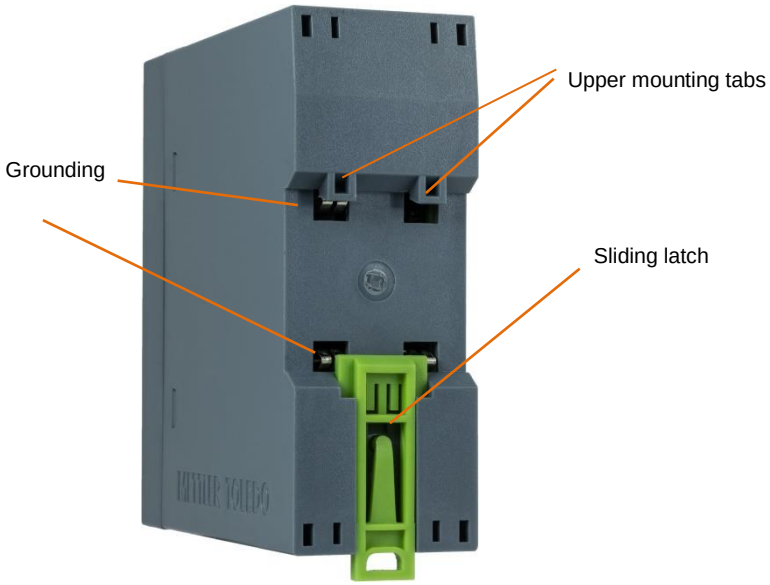


Figure 3-2: DIN-Mount Latch

To mount the ACT350 Precision on a rail, open the latch by pulling down, then position the transmitter so that its upper tabs rest on the DIN rail.

Use a screwdriver to close the latch and secure the transmitter in position.

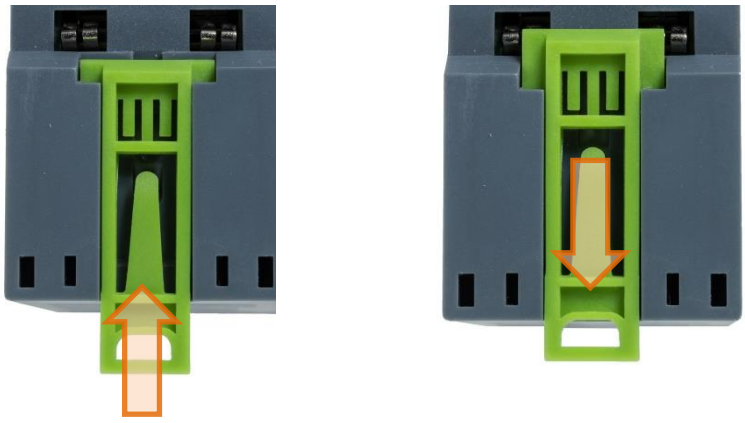


Figure 3-3: Latch Closure

To remove the ACT350 Precision, simply put the blade of a screwdriver in the latch and press it downward

NOTICE

In order to ensure proper dissipation of heat from the transmitter's PCBs, and to avoid damage to the equipment, **the ACT350 Precision must be mounted vertically**, on a horizontal din rail.

.

3.3. Electrical Installation

Figure 3-4 indicates ACT350 Precision front panel connections.

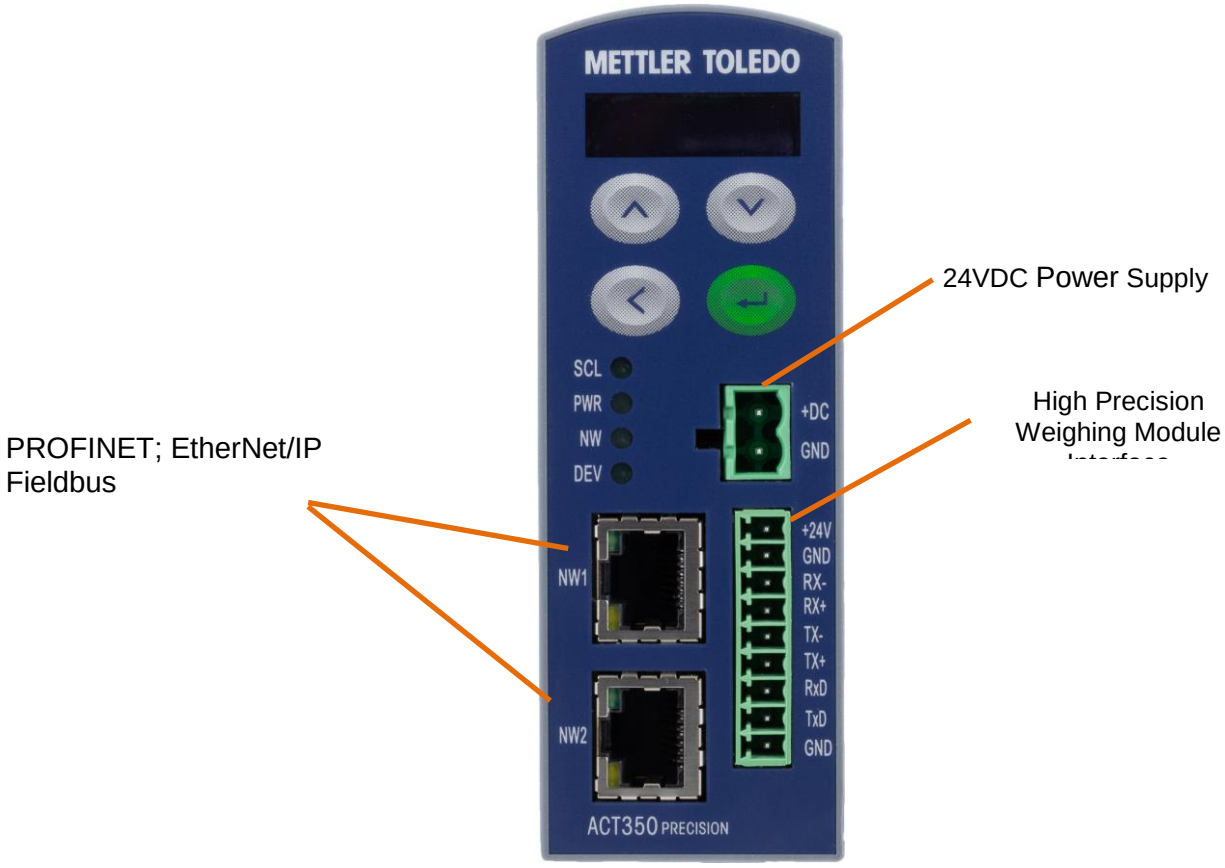


Figure 3-4: ACT350 Precision –PROFINET or EtherNet/IP

NOTICE

The ACT350 Precision supply voltage is 24VDC ± 10%, and the power supply needs to be able to provide 2000mA output.

ATTENTION

Check the Weigh Module or Scale manual to confirm the power supply voltage. The Weigh Modules or Scales powered by 12VDC should be supplied by an external power source.

3.3.1. High Precision Weighing Module Interface

The ACT350 Precision is developed to connect Precision Scales and Automatic Modules listed in Table 3-1.

There are two supporting levels related to the PLC commands.

Communication	Precision weigh modules / scales	Commands supported through the PLC interface
Full level support	PBK9_ APW (only APW version) PFK9_ APW (only APW version) SLF6 High Precision Weigh Module WKC High Precision Weigh Module WMS High Precision Weigh Module	- Weight, status, tare, zero, calibrate, reset - View and configure parameters of weighing module via webserver - Sensor firmware upgrade via webserver (Weigh value to PLC limited to 7 digits)
Basic level support	ICS4__ Scale & Terminal ICS68_ Scale & Terminal WMC High Precision Weigh Module WX_ High Precision Weigh Module XPR___ Labatory Balance XSR___ Labatory Balance	- Weight, status, tare, zero (Weigh value to PLC limited to 7 digits)

Table 3-1 List of supported High Precision Weighing Modules.

ATTANTION

A full list of PLC commands suppurated by ACT350 Precision is available in SAI Manual at **www.mt.com/ind-act350-downloads**

In the case of using RS485 interface of Weigh Module, connect RS485- to RX-/TX-, RS485+ to RX+/TX+ on the ACT350 Precision side.

NOTICE

The TX and RX cross wiring between Weigh Module or Scale and ACT350 Precision should be done for correct connection. See below in the Figure 3-5.

ACT350 Precision Pin Assignment			Weigh Module Signal		
	**Pin No.**	**Signal**	**RS232**	**RS422**	**RS485***
	1	+24V	VDC	VDC	VDC
	2	GND	GND	GND	GND
	3	RX-		TX-	RS485-
	4	RX+		TX+	RS485+
	5	TX-		RX-	RS485-
	6	TX+		RX+	RS485+
	7	RxD	TxD		
	8	TxD	RxD		
	9	GND	GND		

Figure 3-5 ACT350 Precision Pin Assignment

NOTICE

Please refer to the individual Weigh Module or Scale connection installation guide for correct wiring instruction.

3.3.1.1. Connecting to PBK9/PFK9 APW (WKC/SLF6) with 24VDC

When the PBK9/PFK9 APW, WKC and WKC/SLF6 series weighing modules are connected, the correspondence between the module cable and the ACT350 Precision interface signal is shown in Table 3-2.

Weigh Modules such as WKC (24VDC), PBK-9_APW / PFK-9_APW and SLF6 can be powered by ACT350 Precision directly.

ACT350 Precision Pin Assignment			Weigh Module Signal			APW products examples	
	Pin No.	Signal	RS232	RS422	RS485*	PBK-9; PFK-9; SLF-6; WKC	Cable colors**
	1	+24V	VDC	VDC	VDC	White	
	2	GND	GND	GND	GND	Brown	
	3	RX-		TX-	RS485-	Purple	
	4	RX+		TX+	RS485+	Orange	
	5	TX-		RX-	RS485-	Violet	
	6	TX+		RX+	RS485+	Black	
	7	RxD	TxD			Yellow	
	8	TxD	RxD			Pink	
	9	GND	GND+Shield	Shield	Shield	Red (RS232)	
						Green (RS422)	

Table 3-2 Pin Assignment and signals connection wiring scheme with 24VDC Power Supply.

3.3.1.1. Connecting to WKC APW products with 12VDC

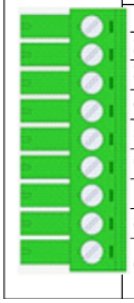
ACT350 Precision Pin Assignment			Weigh Module Signal			APW products examples	
	Pin No.	Signal	RS232	RS422	RS485*	WKC	Cable colors**
	1	+24V	The external power source should be used for 12VDC Weigh Modules or Scale				
	2	GND					
	3	RX-		TX-	RS485-	Purple	
	4	RX+		TX+	RS485+	Orange	
	5	TX-		RX-	RS485-	Violet	
	6	TX+		RX+	RS485+	Black	
	7	RxD	TxD			Yellow	
	8	TxD	RxD			Pink	
	9	GND	GND+Shield	Shield	Shield	Red (RS232)	
						Green (RS422)	

Table 3-3 Pin Assignment and signals connection wiring scheme with 12VDC Power Supply

* Some manuals also use A-(or D-) and B+(or D+) to refer to RS485- and RS485+ respectively.

** Cable color of the METTLER TOLEDO standard cables.

ATTENTION

Weigh Modules or Scales powered by 12VDC should be supplied using an external power source.

3.3.1.2. Wiring connection examples for APW products.

<table>
<tr><th>APW Weigh Module Type</th><th>Cable type / Power Supply</th><th>ACT350 Precision</th></tr>
<tr><td>WXS
  </td><td rowspan="2"> 

Cable No: 11141979 only RS232
Power Supply: powered externally</td><td rowspan="6"> 

Order Item No:

30476263 (PROFINET)
30476264 (EtherNet/IP)</td></tr>
<tr><td>WMC
  </td></tr>
<tr><td>WMS
  </td><td> 

Cable No: according to data sheet RS232/RS422
Power Supply: 24 VDC powered by ACT350 Precision</td></tr>
<tr><td>PBK9 / PFK9
  </td><td rowspan="3"> 

Cable No: according to data sheet RS232/RS422
Power Supply: 24 VDC powered by ACT350 Precision</td></tr>
<tr><td>SLF6
  </td></tr>
<tr><td>WKC
  </td></tr>
</table>

NOTICE

Please refer to the individual Weigh Module or Scale connection installation guide for correct wiring instruction.

3.3.1.1. Recommended Maximum Cable Lengths.

Scale Interface	Meters/feet
RS232	15 / 50
RS422 / RS485	304 / 1000

3.3.1.1. EMC performance for High Precision Weighing Module.

For better EMC performance, it is recommended to install a magnetic ring near the ACT350 Precision weigh module interface plug, as shown in Figure 3-6.

The Magnetic ring installation should be installed close to the weighing module interface plug of the ACT350 Precision.

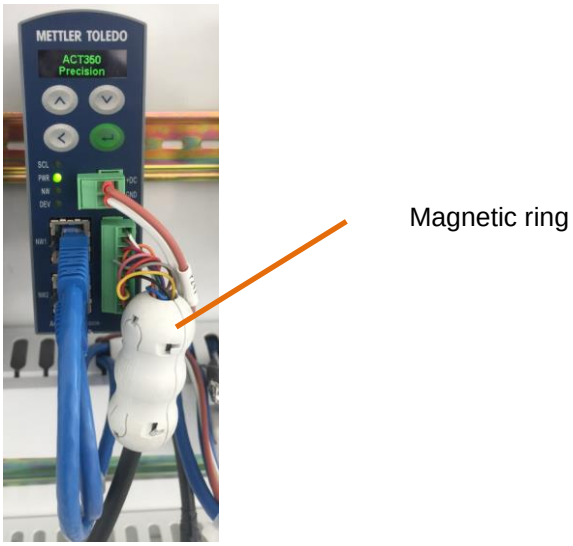


Figure 3-6 Magnetic ring installation

The magnetic ring is in scope of standard delivery of ACT350 Precision. It has two buckles as shown in Figure 3-7.

When closing, you need to secure the two buckles separately.

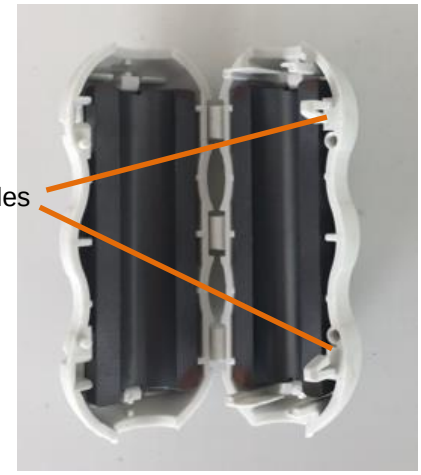


Figure 3-7 Magnetic Ring

When opening the magnetic ring, use a screwdriver to push the buckle out, as shown in Figure 3-8.

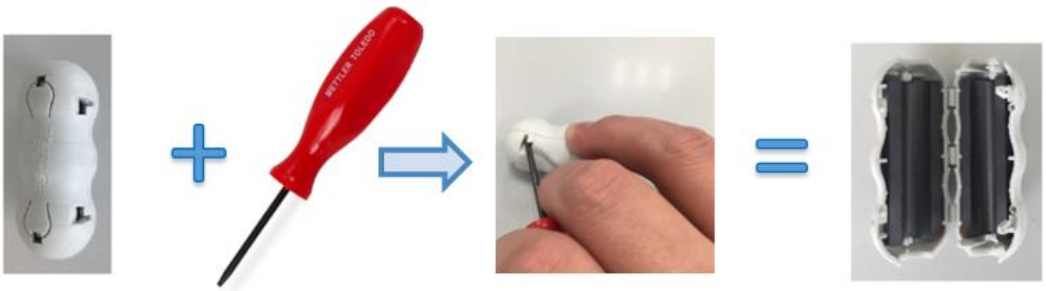


Figure 3-8 Opening process of Magnetic Ring

3.3.2. Digital Inputs and Outputs connecting Instruction.

Three digital inputs and five outputs are located on top of each ACT350 Precision as seen in Figure 3-9. Table 3-4 shows the specifications for the inputs and outputs.

Figure 3-9: ACT350 Precision, Top View

Table 3-4: Digital Inputs and Outputs Specification

	Input	Output
Permissible input voltage	0 ~ 24 VDC	5~30 VDC
Logical Low-level	0 ~ 5 VDC	
Logical High-level	10 ~ 24 VDC	
Input resistance	>3KΩ	
Max.current of one output		<150mA
Accumulated current of all outputs		<750mA
Support Sinking	GND connected to IN-COM	GND connected to OUT-COM
Support Sourcing	Power source to IN-COM	Power source to OUT-COM
Default function	Zero	
Polarity Value	+True(Default) or –True	
Available Functionality	None; Clear Tare; Tare; Zero	None; Comparator 1-5; Fault; Motion; NET; Over Capacity; Under Zero

Example: Using a rising-edge input signal to trigger the ACT350 to perform a Zero operation, "Polarity" can be set as "+ True" and "Assignment" as "Zero". Refer to Figure 3-10**:**

Figure 3-10: A Rising-edge Trigger Signal on Input

Using a falling-edge signal on Input to trigger ACT350 perform a Tare operation, "Polarity" can be set as "- True" and "Assignment" as "Tare". Refer to Figure 3-11**.**

Figure 3-11: A Falling-edge Trigger Signal on Input

NOTICE

Do not use input voltage between 5 – 10 VDC. Unstable input signal will result. See Figure 3-10 and 3-11 for proper operation

Digital inputs and Outputs electrical connection instruction is shown below. (from Figure 3-12 to Figure 3-15)

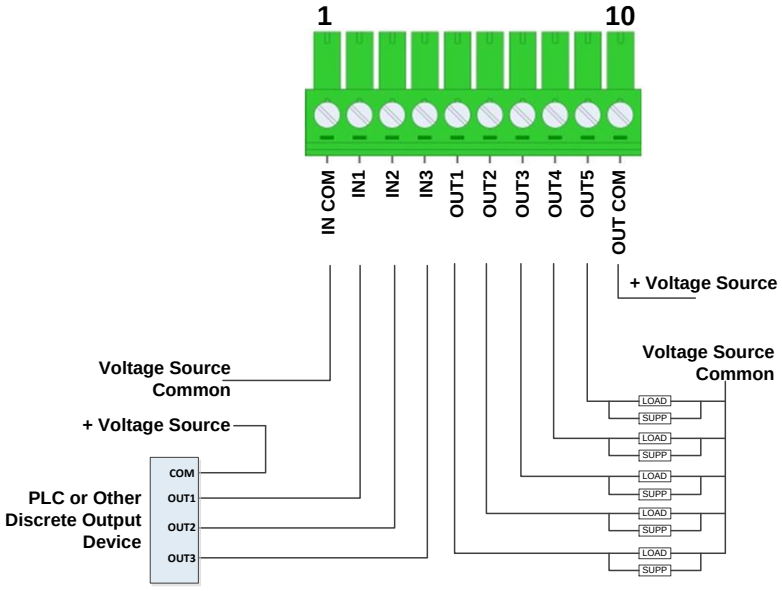


Figure 3-12: Sinking Input, Sourcing Output

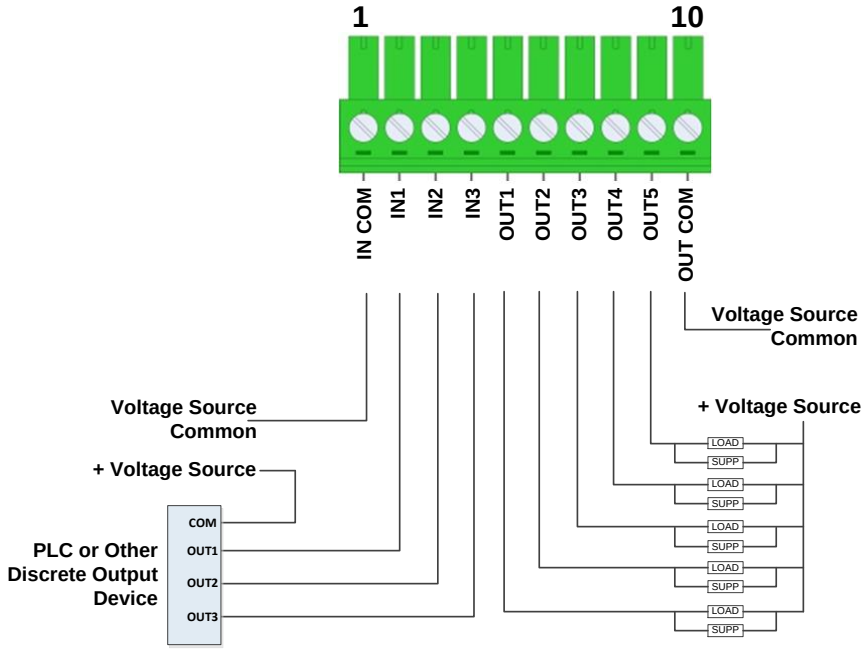


Figure 3-13: Sinking Input, Sinking Output

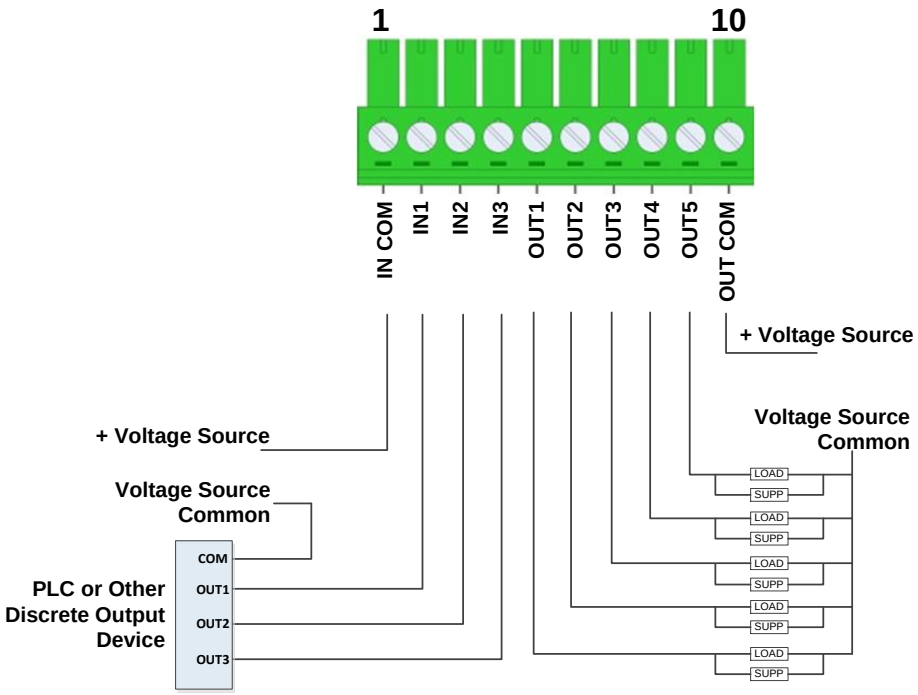


Figure 3-14: Sourcing Input, Sourcing Output

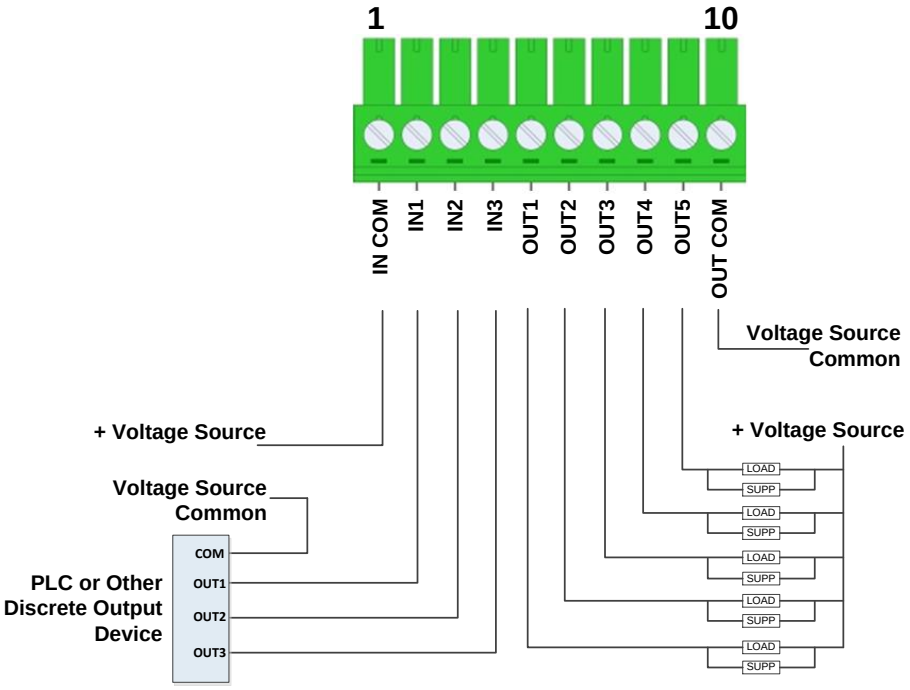


Figure 3-15: Sourcing Input, Sinking Output

3.3.3. PLC Connection

The two RJ45 ports of the ACT350 Precision have an integrated switch and can be connected to PLCs or industrial switches that support PROFINET or Ethernet/IP communication protocols.

For example, the dual network ports support ring network connections, as shown in Figure 3-16, the two network ports are in and out.

The system can be optionally connected in a “daisy chain” structure. If the last unit is connected back to the PLC, the ring network structure is formed.

Figure 3-16 ACT350 Precision Daisy chain

NOTICE

Ethernet cables are the industry standard 8P8C (RJ45).

3.3.4. MRP and DLR Ring Topology

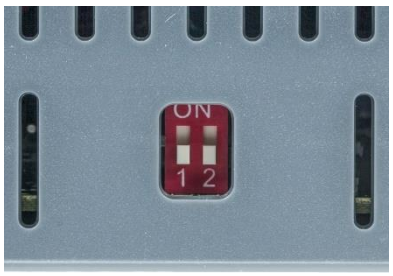
All **PROFINET ACT350 Precision** units support the setting up of a **MRP** (Media Redundancy Protocol) redundant topology in the form of a ring, both for IO communication and for the standard TCP/IP communication.

All **Ethernet IP ACT350 Precision** units support the setting up of a **DLR** (Device Level Ring) redundant topology in the form of a ring, both for IO communication and for the standard TCP/IP communication.

3.4. DIP Switches

Two DIP switches, 1 and 2, are accessible from the underside of the ACT350's housing. Table 3-5 summarizes their functions.

Table 3-5: DIP Switch Functions

ACT350 Precision DIP Switches	Switch 1	Switch 2	Function
	OFF	OFF	Normal operation
	ON or OFF	ON	Master reset of all data during transmitter power-up
	ON	OFF	No function

4 Fieldbus Communication

4.2. Overview

The Standard Automation Interface (SAI) is a protocol designed to exchange data between METTLER TOLEDO devices and third-party automation systems. This interface provides the following:

- A common data layout for load cells, terminals and other devices regardless of the physical interface or automation network used.
- A single protocol for the convenience of automation integrators, control system programmers and our automation customers.
- A flexible protocol for diverse devices.

Communication Modes

The protocol has two primary modes of operation.

- cyclic data
- acyclic data

NOTICE

Acyclic data is also referred to as asynchronous data or explicit messaging.

4.2.1. Cyclic data

Cyclic data is broken up into sections of data. Each section represents a block. Each block of data contains four words of 16 bits each.

The data within these words can express numeric values, individual bits which represent state or commands depending on the type of block specified.

Two fixed formats divided into blocks (1 block, 2 blocks) are available for SAI devices depending on the product. The default format for weigh modules is the two block format with eight words in and eight words out. The number of input words (data sent from the device to the process controller) and output words (data sent from the process controller to the device) always match. This limits the number of configurations to a reasonable amount.

There are two types of cyclic blocks supported on the SAI device:

- Measuring block (IEEE 754 floating point data)
  - Used for numeric values
  - Decimal point and sign included and do not require special data handling
- Status block

– Used for numeric values

– Status block data grouped together in 16 bit words.

4.2.2. Acyclic data

With acyclic messages, the variable can be accessed directly through a unique name or number defined by the control system's acyclic message block.

NOTICE

Acyclic data is also referred to as asynchronous data or explicit messaging.

Refer to the applicable SAI Reference Manual **available at www.mt.com/ind-act350-downloads** for detailed information

5 Troubleshooting PLC Connectivity

If the ACT350 Precision does not communicate with PLC, do the following:

- Power cycle the ACT350 Precision to reestablish communications.
- A solid green NW LED on the front panel implies that the ACT350 Precision and the PLC have established cyclic communication. A flashing NW LED indicates that the ACT350 Precision has not established cyclic communication with the PLC.
- Check LED status of the connection socket. The top LED should be solid green. If the top LED is not solid green, this implies that no hardware connection is seen by the device -check cabling and connector insertions. The bottom LED will blink amber if data is being transferred. If the top LED is solid green, but the bottom LED is not blinking, this implies a configuration issue - either in the ACT350 or the PLC.
- Confirm that the ACT350 Precision can respond to a ping on the network. If it doesn't, check the wiring and network connections.
- Diagnose and correct specific network error conditions such as IP Address conflicts.
- Confirm that the ACT350 Precision settings for address, format and byte order match those in the PLC and that each ACT350 Precision has a unique address.
- Check the Electronic Keying from the PLC program. Confirm that the firmware revision of the Ethernet/IP module in the ACT350 Precision is greater than or equal to the firmware revision specified in the ACT350's communication module in the PLC. Change the firmware revision being looked for in the PLC's communication module if necessary.
- Contact METTLER TOLEDO for replacement of the ACT350 Precision transmitter.
- Visit the METTLER TOLEDO web page at **www.mt.com/ind-act350-downloads** to check the most up to date Troubleshooting information.

6 Webserver Configuration Tool

6.1. General Overview

Each ACT350 Precision has an integrated Webserver application which allows the user to configure the ACT350 Precision or connected Weigh Module.

It can also be connected to the Weighing Module for parameter settings and maintenance via the RJ45 interface of the ACT350 Precision using the APW-Link software.

6.2. Webserver basic functions

The ACT350 Precision Webserver is mainly available to support the following functions:

- Configuring of the ACT350 Precision Transmitter using local PC
- ACT350 Precision Transmitter and Weighing Module software upgrade and maintenance
- Limited parameter settings of connected Weighing Module Accessing diagnostic and maintenance information for service purposes;

6.3. Webserver access

The Webserver Configuration tool is available via the RJ45 interface of the ACT350 Precision using a browser such as IE, Chrome or Safari;

NOTICE

Internet Explorer is suggested as the default browser to communicate with the ACT350 Precision webserver.

By entering the IP address of ACT350 Precision Transmitter in the address bar of the web browser window, the startup screen of the Webserver will automatically be displayed. Figure 6-1.

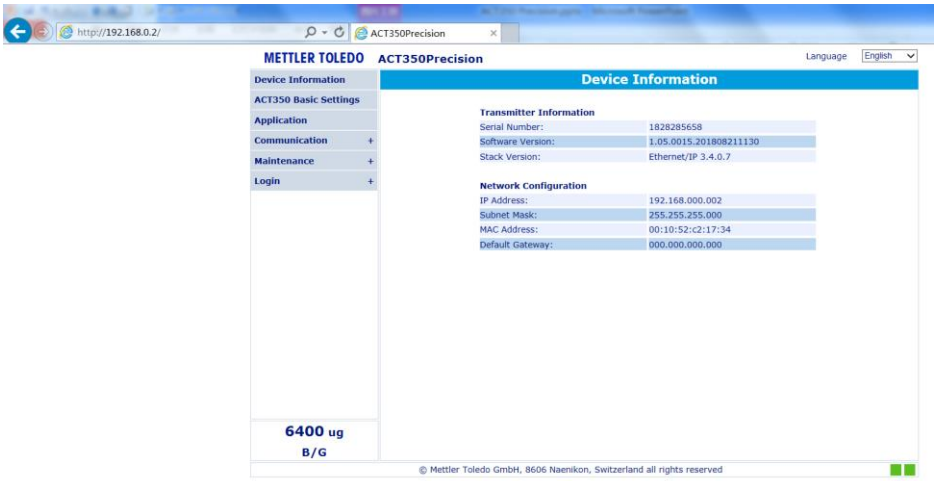


Figure 6-1 The ACT350 Precision Webserver Main Window

6.3.1. The Webserver PC Setup example.

The typical PC's configuration:

IP address: 192.168.0.X (X = 0 ~ 255, exclude 2),

Subnet Mask: 255.255.255.0,

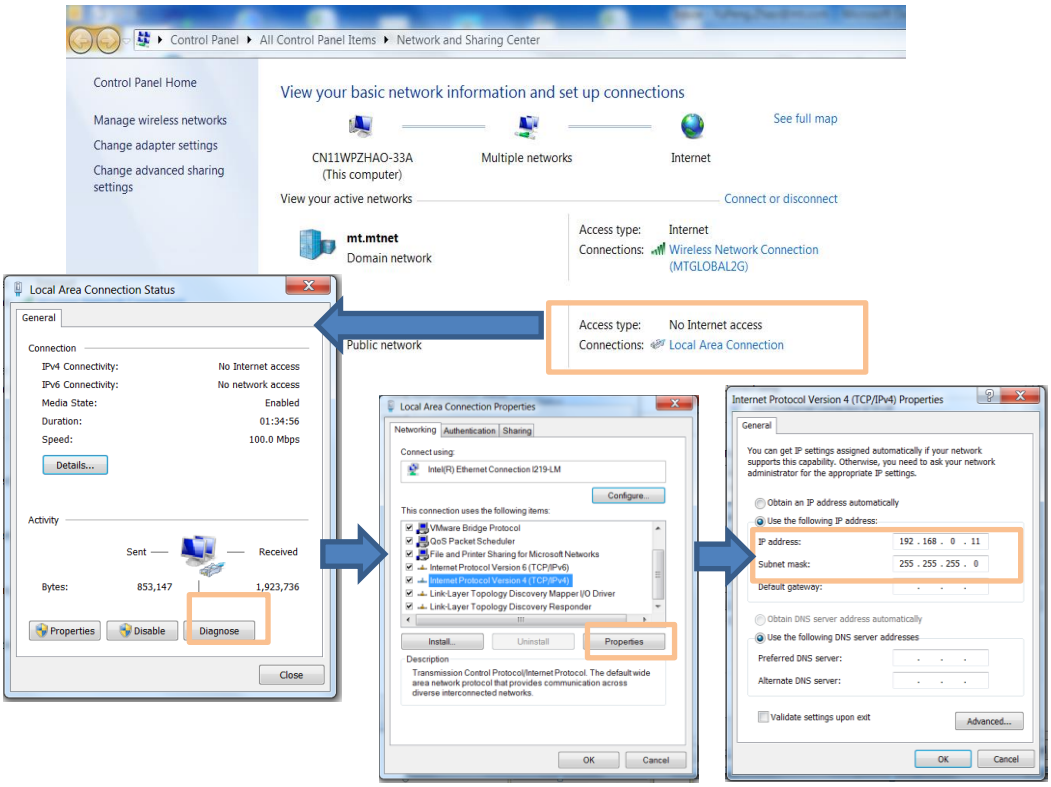


Figure 6-2 Local Area Connection Setting

NOTICE

The default setting of ACT350 Transmitter is as follows:
IP address: 192.168.0.2, Subnet Mask: 255.255.255.0, Gateway: 192.168.0.

6.3.1.1. IE setup

Internet Option -> LAN setting -> Automatically detect settings should be unchecked.

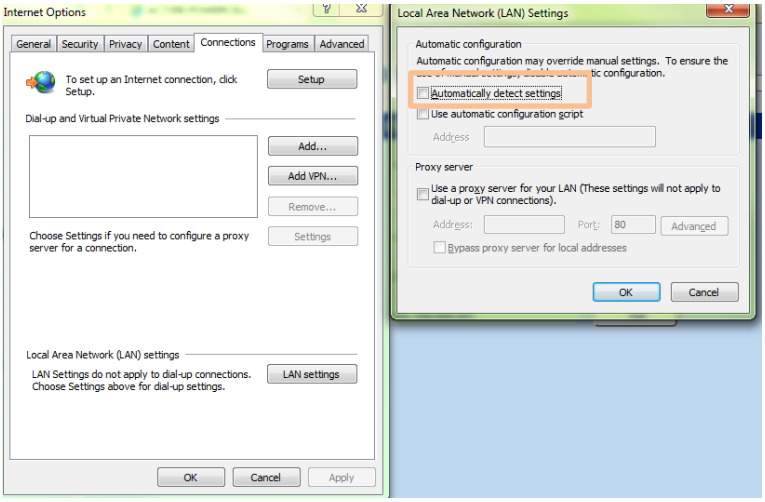


Figure 6-3 IE setting

6.3.2. Setup ACT350 Precision via Webserver

The front Webserver page of the ACT350 Precision presents Device Information as below:

- Transmitter Information (Serial Number, Software Version, Stack Version)
- Network Configuration (IP Address, Subnet Mask, MAC Address, Gateway)

The main menu located on the left side of the page is used to navigate device settings.
The main sections of the menu are:

- ACT350 Basic Settings
- Application
- Communication
- Maintenance
- Login

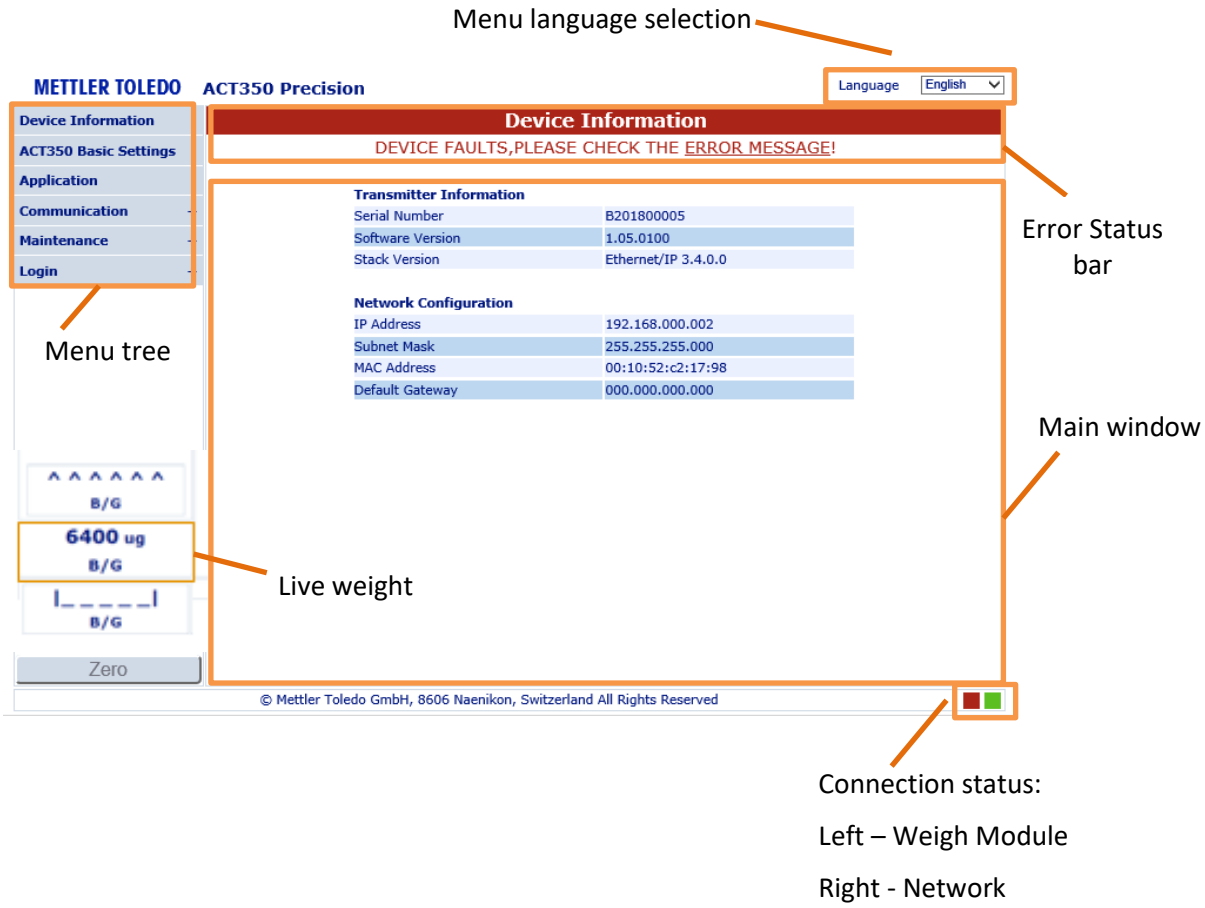


Figure 6-4 ACT350 Precision Webserver Main Window

The main window presents the content details from the menu on the left side of the window.

The error status bar is located at the top of each page. Whenever there is a warning or error message, the error status bar will change color from standard blue to red. Additional information about device faults will appear together with a direct link to the error section.

A) Normal operation without error.

B) Error warning bar.

Figure 6-5 Error status bar A) Normal operation without error; B) Error warning bar

6.3.2.1. Device Information

The Basic Transmitter and Network information are provided as shown in Figure 6-6.

Transmitter Information	
Serial Number	B201800005
Software Version	1.05.0100
Stack Version	Ethernet/IP 3.4.0.0

Network Configuration	
IP Address	192.168.000.002
Subnet Mask	255.255.255.000
MAC Address	00:10:52:c2:17:98
Default Gateway	000.000.000.000

Figure 6-6 Transmitter and Network Basic Information

6.3.2.2. ACT350 Basic Settings

There are three basic settings for ACT350 Precision:

- **Display Auto Off,** the front panel display can be set up to automatically switch off after **1 minute, 10 minutes** or **30 minutes** of inactivity **or Disabled** (display never turns off).
- **Display Language,** to set the language of the device **(English / Chinese)**
- **Pushbuttons,** to **Enable** or **Disable** the front panel push buttons of the ACT350 Precision.

NOTICE

When the front panel pushbuttons are disabled, the ACT350 Precision setting and navigation are available ONLY via webserver.

6.3.2.3. Application

The application section is mainly dedicated to setting the comparators.

The ACT350 Precision device supports a total of five comparators. Any number of comparators between 1 and 5 may be used. Choose the number of comparators first and set individual discrete inputs and outputs similarly as described in Chapter 2.4.4 Comparators Communication

In this menu, user can view and configure the parameters related to PLC and Weigh Module communication.

- **Industrial Ethernet**

PROFINET or EtherNet/IP are both types of Industrial Ethernet used by ACT350 Precision to communicate with the PLC. Table 6-1 presents parameters of PLC interface type, Fieldbus Format and IP address etc. Figure 6-7 shows a PROFINET example.

Table 6-1: Industrial Ethernet Menu

PLC Interface Type	PROFINET or EtherNet/IP
Fieldbus Assignment	SAI
FieldBus Format	1-Block or 2-Block Format
Byte Order	Automatic, Big Endian or Small Endian
MAC Address	xx:xx:xx:xx:xx:xx
Device Name	Valid only for PROFINET, show the device signed by PLC
IP Address	xxx.xxx.xxx.xxx
Subnet Mask	xxx.xxx.xxx.xxx
Gateway	xxx.xxx.xxx.xxx

Figure 6-7 PROFINET Menu as Example

- **Weigh Module Connection**

Depending on the Weigh Module model, the ACT350 Precision can be connected to Weigh Module via RS-232, RS-422 or RS485.

NOTICE

It is recommended to use RS-422 interface to connect ACT350 Precision to keep the seed and quality.

Please refer to Section High Precision Weighing Module Interface for more information about connecting.

When the ACT350 Precision connection succeeds, user can setup Weigh Module parameters using the Webserver of ACT350 Precision.

Before connecting to the Weigh Module, the connection status is shown as Disconnected (Figure 6-8) and the error status bar is RED to show the existence of an error.

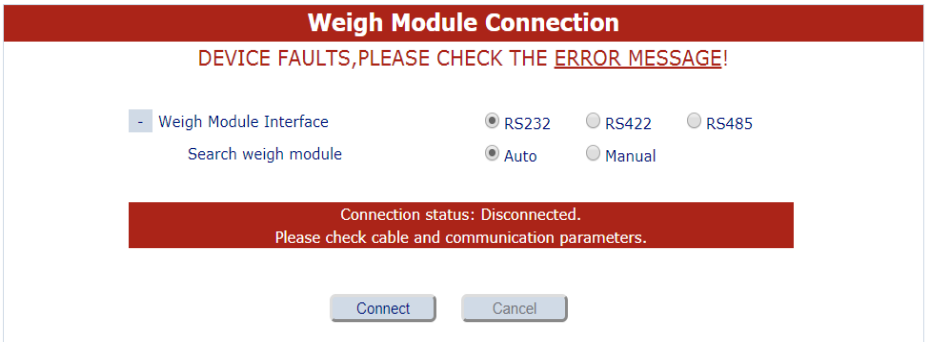


Figure 6-8 Disconnected to Weigh Module

There are two potential methods to connect the Weigh Module with ACT350 Precision. In Auto mode, user only needs to click the Connect button and searching starts automatically. The Connect Status changes to Connecting and communication parameters of Serial Port are automatically cycled through and tested by ACT350 Precision until either a successful connection is made or all options have failed to connect.

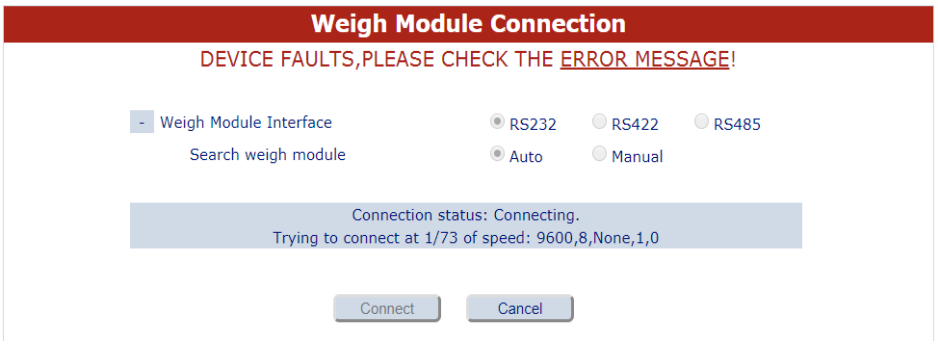


Figure 6-9 Automatically Connect to Weigh Module

In manual mode, user shall setup the communication parameters, shown in Table 6-2, and then click Connect button.

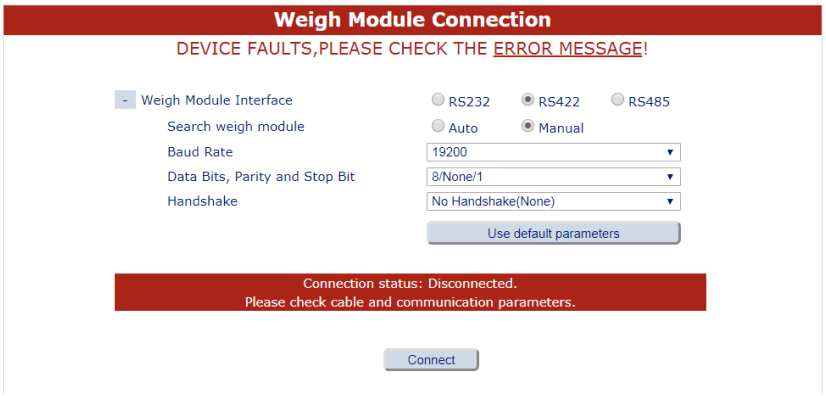


Figure 6-10 Manually Connect to Weigh Module

Table 6-2: Communication Parameters of Serial Port

Baud Rate	300 ~ 115200
Data/Stop/Parity Bit	8 Data Bits, 1 Stop Bit, No Parity(8/None/1), 7 Data Bits, 2 Stop Bits, Even Parity(7/Even/2), 7 Data Bits, 2 Stop Bits, Odd Parity(7/Odd/2), 7 Data Bits, 2 Stop Bits, No Parity(7/None/2), 8 Data Bits, 2 Stop Bits, No Parity(8/None/2), 7 Data Bits, 1 Stop Bit, Even Parity(7/Even/1), 7 Data Bits, 1 Stop Bit, Odd Parity(7/Odd/1) or 7 Data Bits, 1 Stop Bit, No Parity(7/None/1)
Handshake	None or XON/XOFF

The actual communication parameters can be viewed in the connection status bar whose background changes to GREEN when connection succeeds.

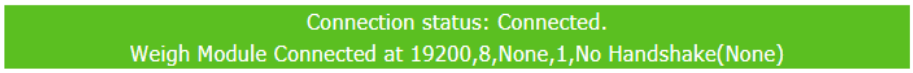


Figure 6-11 Weigh Module Connected

As long as connection completes successfully, user can see the Weigh Module model and corresponding menus on the left side of ACT350 Precision web page, shown in Figure 6-12.

The WKC is used as an example, where all Information, Basic Settings, Weighing Settings, Test & Adjustment and Connection Settings menus can be seen.

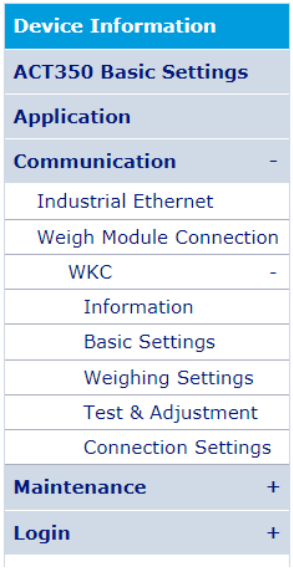


Figure 6-12 Weigh Module(WKC) menu

NOTICE

Please refer to the corresponding Weigh Module manual for information on how to use the parameters in Weigh Module menus.

6.3.2.4. Maintenance

There are three main sections available in the Maintenance part of the ACT350 Precision Webserver Service tool:

- **Statistics –** where error counts, firmware downloads success and failure counts are reported. Figure 6-13

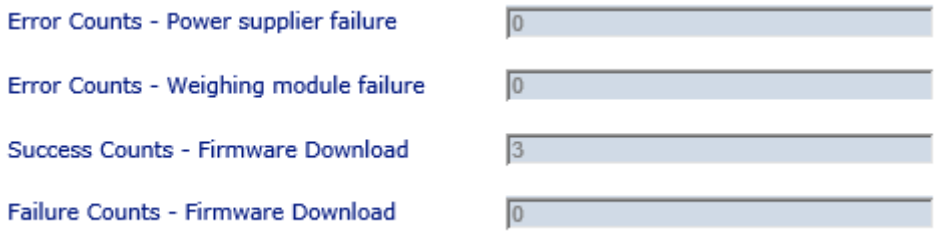


Figure 6-13 Statistics

- **Error Messages –** displaying all current error messages and notification**.**

The error message can be directly accessed using the red error status bar, which will pop up immediately when an error or any other important notification is detected. In this section, more information about errors or notifications can be found. Please check Figure 6-14 to see an example and Table 6-3 for a full list of available Error Messages Shown on Display.

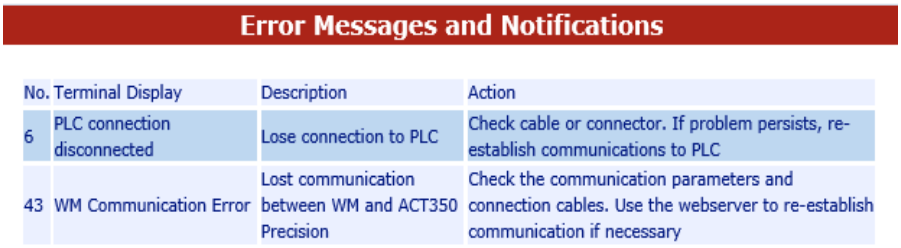


Figure 6-14 Error messages and notification example.

Table 6-3 Errors Messages Shown on Display

Error value	ACT350 Precision Display	Description	Action
002	"Calib. In process"	Remote Calibration(via WebServer) is in process	No actions, allow calibration process to finish.
005	“NW Module init. fail”	Hardware for PLC communication initialization fail	Cycle power; call service if issue persists
006	“PLC connection disconnected”	Lost connection to PLC	Check cable or connector. If problem persists, re-establish communications to PLC
009	“Board info. Err”	Hardware production information error	Cycle power; call service if issue persists
010	“Calib. Block err”	Calibration block data error; block data is lost	Perform master reset Re-calibrate
011	“Scale block err”	Scale block data error	Perform master reset Perform setup for scale block
012	“Term. Block err”	Transmitter block data error	Perform master reset Perform setup for transmitter block
013	“APP. Block err”	Application block data error	Perform master reset Perform setup for application block

014	“COM. Block err”	Communication block data error	Perform master reset Perform setup for communication block
015	“Maint. Block err”	Statistics block data error	Perform master reset Perform setup for maintenance block
020	“Zero failed/Out of range”	Weight out of zero range	Unload scale and perform Zero again
021	“Zero failed Zero disabled”	Zero attempted when function disabled in Setup menu	Enable Zero function in Setup menu
030	“Tare Failed, over capacity”	Tare failed due to scale being over capacity	Unload weight on scale until overcapacity is cleared and perform Tare again
034	"Tare failed"	Tare failed due to weight out of range or scale not stable or disabled Tare function	Confirm tare function is enabled or confirm weight is in tare range or allow weight to settle
038	"WM Supply Beyond Voltage"	Overvoltage of power supply for WM	Check the weigh module supply voltage that should be lower than 26.4V
039	"WM Supply Over Current"	Overcurrent of power supply for WM	Check the weigh module supply current that should be lower than 2000mA
043	" WM Communication Error"	Lost communication between WM and ACT350 Precision	Check the communication parameters and connection cables. Use the webserver to re-establish communication if necessary

- **Firmware Downloads -** allows user to update ACT350 Precision and Weigh Module firmware.

NOTICE

The latest valid ACT350 Precision firmware files are ready to be downloaded from
www.mt.com/ind-act350-downloads.

Once the latest firmware file is downloaded to your PC, please browse to the file and start the downloading process. Follow next steps to finish the process. At the end of the process, the ACT350 Precision will restart automatically.

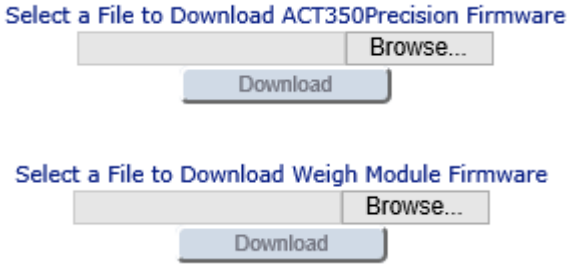


Figure 6-15 Firmware downloading process.

NOTICE

When a download is attempted using an incompatible firmware file, the automatic cross checking function will automatically display a notification that a different, correct file must be used.

Figure Table:

METTLER TOLEDO Service

To protect your METTLER TOLEDO product's future:

Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use according to these instructions and regular calibration and maintenance by our factory-trained service team ensure dependable and accurate operation, protecting your investment. Contact us about a METTLER TOLEDO service agreement tailored to your needs and budget.

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.

www.mt.com/ACT350-Precision

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