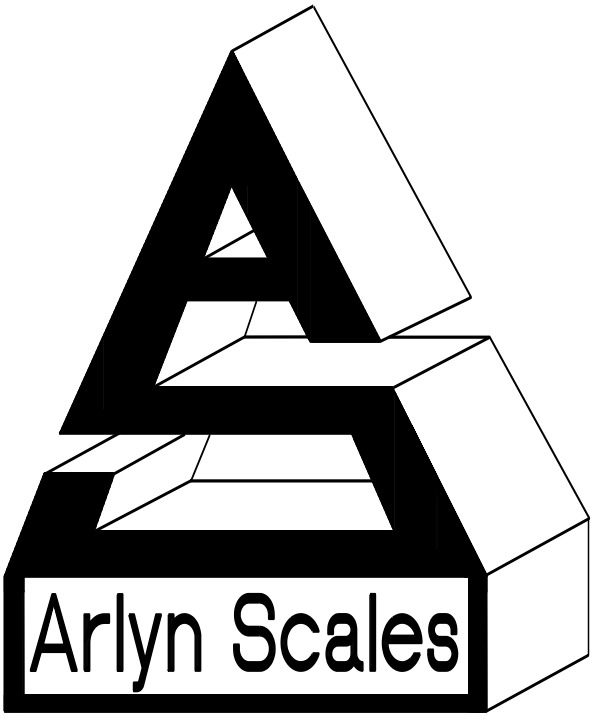
Digital Scales

Model MKE-5-IS (-C)
Intrinsically Safe Weighing System

Instruction Manual



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Contents

Your New Scale

Congratulations on your purchase of an Arlyn Digital Scale. This Scale offers a combination of versatility, accuracy and simplicity in an easy to use and easy to maintain package. Intrinsically safe operation, advanced menu driven operating software, large memory capacity and an easy to use menu structure allows the scale to be configured for almost any application. To obtain the best performance and greatest utilization from your scale, read this instruction booklet completely and carefully.

This intrinsically safe scale system is provided in one of two formats:

- An indicator with one or more load cells that are already factory installed in a platform (the most common). In this case, all wiring, including the connector, has been done at our factory.
- An indicator with a one or more load cells where the user installs the load cell in their existing equipment. In this case the user will have to complete the load cell and connector wiring following the control drawings at the end of this manual.

Before installing this system, please read and fully understand the section in this manual entitled “Intrinsic Safety, Limitations and Restrictions”.

Please enter the Serial Number, which is located on the scale serial plate. Retain this information for future reference.

No. .

Features

* Easy to read, LCD Graphics display
* Single C cell rechargeable battery operation
* A variety of FM approved load cells are available
* Automatic Calibration
* Multiple Tare Weights
* No Moving Parts
* Large Memory Capacity
* Eight Unit Conversions Standard
* High Accuracy Parts Counting on Many Models
* Automatic or Numeric Entry Tare
* Sealed “Click-Type” Control Panel
* Computerized Self Testing
* Automatic Zero Tracking
* Full Text and Floating Point Entry
* Optional Weight Average Function
* Optional Infrared Communications Interface

Best Conditions for Weighing

1) The scale should be near level.
2) Best operating temperature is about 68 degrees F.
3) The weighing area should be kept clean and dry.
4) The surface that the scale is resting on should be of solid construction and not prone to vibrations.
5) Don’t install the scale near heater or air conditioner vents. Avoid drafts.
6) Do not operate the scale in close proximity of RF transmitters like cell phones and walkie-talkies.
7) Warm-up the scale before use.

General Precautions

1. This FM approved, intrinsically safe scale system must be installed and used in accordance with the approved installation documents in this manual, as well as any other Federal, State, Local or other regulations concerning the installation of intrinsically safe equipment.
2. Allow clearance on all sides of scale platform for accurate weighing.
3. Do not drop large loads on scale platform.
4. NEVER EXCEED THE RATED CAPACITY OF THE SCALE.
5. Do not pull on the connecting electrical cables.
6. Make sure that the scale and ramps are properly secured to the floor (most models).

This Manual

This instruction manual covers the installation and operation of the MKE-5-IS(-C) Intrinsically Safe Scale Indicator. Indicated below are the manual’s current revision number and number of pages. Please check this manual and its control drawings for missing pages. The installation cannot continue unless all pages are present.

Instruction Manual	MKE-5-IS(-C) Instruction Manual	Rev 1.00, 21 Pages including control drawings
Control Drawing #4010	MKE-5-IS(-C) General Dimensions	Rev 1.01, 1 Sheet
Control Drawing #4011	MKE-5-IS(-C) Indicator Label Drawing	Rev 1.04, 1 Sheet
Control Drawing #4013	MKE-5-IS(-C) Inst. and Wiring Diagram	Rev 1.04, 1 Sheet

Factory Mutual Approval and Intrinsic Safety

The MKE-5-IS Scale System has been rated intrinsically safe by Factory Mutual only when used with specific intrinsically safe Arlyn load cells and the installation is performed by a qualified technician who conforms to the guidelines described in this manual. Consult the chapter titled “Installation and Wiring” along with the control drawings in the back of this document for information pertaining to the installation and wiring of approved load cells.

The system is rated intrinsically safe by FM for use in the following areas:

Class I, II, III, Division 1, Groups A, B, C, D, E, F & G
Class I, Zone 0, AEx ia IIC (T3 Ta=60C)
Indoor Hazardous (Classified) Locations.
Nonincendive for use in Class I, Division 2, Groups A, B, C and D
Suitable for use in Class II, Division 2, Groups F & G, Class III, Division 2 indoor Hazardous (Classified) Locations.

Intrinsic Safety, Limitations and Restrictions

The following items represent limitations and restrictions concerning using this scale system as a FM approved intrinsically safe system. All items on this list must be adhered to for FM approval to be valid. Disregarding any of these items will violate intrinsic safety and FM approval, possibly resulting in serious injury or death.

- The installation needs to be performed by a qualified technician who is familiar with National Electrical Code and RP 12.6 (Recommended Practice) requirements for installation of equipment in hazardous areas. Consult NEC Article 504, Intrinsically Safe Systems, published through the Instrument Society of America.
- Only Arlyn, FM approved, 4500 ohm load cells may be used. Up to four may be connected.
- The installation technician must conform to all instructions and control drawings in this manual.
- The indicator and load cells must have the appropriate labeling that is in compliance with the control drawings.
- All wiring and connections must comply with the National Electrical Code (NEC).
- The cable type and length limitation must comply with the control drawings.
- No modifications of this system may be made in the field. Component level repair is not permitted on Factory Mutual approved equipment. It is mandatory to return the unit to Arlyn Scales for repair.
- Removal of the battery is not allowed when the scale is located in a hazardous area. The indicator must be removed from its mounting bracket and taken to a safe area. Only then can the battery cover be removed and the battery recharged or replaced.
- To avoid the possibility of static buildup, the indicator housing must not be cleaned or rubbed down with a dry cloth while it is located in a hazardous area.

Installation and Wiring

The MKE-5-IS is simple to install and operate. The single C cell battery operation eliminates the need for electrical power conduits. The only wiring necessary is for the attachment of the load cells and the optional infrared communications cable. Please read this manual in its entirety prior to doing the actual installation. Please focus special attention on the section entitled “Battery Operation – Charging and Use”. A complete understanding of the care, maintenance and operation of the battery and its holder is vital for safe operation.

Tip ***Before doing the actual installation, you may wish to get some batteries charging now!***

Installation Checklist

Please use the following checklist to guide you through the installation and setup. This checklist is only a guide. You should read all applicable areas in this manual at each step of the checklist.

Initial Preparation

- Read the section at the beginning of this manual entitled “This Manual”. Using the information found there, make sure that all pages have been included in this manual along with the appropriate drawings. The installation cannot continue unless all documents are present.

- Examine Control Drawing # 4013. This drawing indicates the types of hazardous environments that this scale may be safely used in. Ensure that this scale is safe for use in your hazardous environment.
- Consult the label drawings for both the indicator and load cells (DOCS 3015 and 4011). Make sure that ALL labels are present and in the correct location. FM approval is not valid if a label is incorrect, unreadable, missing or if the text on the label isn't the same as indicated in the control drawings.

Okay, Let's Get Started

- Prepare the hazardous area by making it temporarily safe while performing this installation.
- Carefully unpack scale from shipping carton. Save packing material for possible future use.
- If the level legs are included separately, then screw one into each corner underneath the scale.
- Place scale on a level surface and adjust the level legs so that all four legs are touching the surface. The platform should not be allowed to "rock" in any direction.
- If your scale comes equipped with ramps, fix them to the floor using the mounting holes provided. This way the ramp will not move during normal use. Be careful not to let the scale platform rub up against the ramp or any other surface, as this would cause non-repeatability and other inaccuracies.
- Decide on a location for the indicator. The unit can be mounted to a wall or desk using the supplied "L" bracket.
- Unscrew and remove the mounting bracket from the indicator.
- Attach the indicators mounting bracket to a wall or other appropriate mounting.
- Remove the indicator from the hazardous area. Charge the battery.
- Obtain all of the necessary load cells and cables appropriate for your installation (four load cells maximum).
- Mount all load cells and complete the wiring using DOC 4013 as a reference. Make sure that the cable is of the correct type indicated on the drawing and that total length is less than the maximum indicated. Solder a DIN connector to the end of the load cell cable. Single load cells purchased from Arlyn Scales will already have this connector attached.
- It is recommended that you ground your platform to a suitable earth ground.
- Using an Ohmmeter, check the resistances of the four leads and compare them against the table. Also check each lead to each load cell frame looking for shorts. There should not be any continuity between the four load cell signal leads and any of the load cell frames.
- If you are planning to use the communications interface, install the infrared cable. One end should be installed against a glass window or door in a manner that the infrared light may easily shine through it. The other end of the cable will be attached to the com port later.
- While the indicator is still in a safe area, install one charged battery into the battery holder and secure the cover. Read and head the warnings in the next section before working with batteries.
- Once the battery is installed, move the indicator into the hazardous area and attach it to its mounting bracket. Tighten the thumbscrew.
- Plug the DIN connector at the end of the load cell cable to the load cell connector on the right side of the indicator.
- If you are using the optional infrared communications interface, plug its free end into the com port jack located on the right side of the indicator just below the load cell connector.
- The scale is now ready to use. The system should be tested for proper operation prior to making the area hazardous.

Normal Operation

- Activate the scale by placing the power switch on the rear of the unit to the ON position. The scale will run a self-test procedure to check its load sensors and electronic circuitry. Upon proper completion, scale will settle on zero. Allow a five-minute warm-up time for stabilization and most accurate results.
- Most pre-assembled scales come from the factory in a calibrated condition. There is no reason to do an initial calibration on these scales.
- If you are wiring the load cells yourself, the indicator may require setup and calibration. Please refer to the sections later in this manual for calibration instructions, or call Arlyn's Service Department (800-645-4301 Ext 101) and we will help you through it. It is not a difficult or time-consuming process.
- Items to be weighed may be placed anywhere on the platform, but if heavy items are to be weighed, it is advisable to place them near the center. Many models are equipped with shock absorbers and positive overload stops for protection. Still, care should be taken to avoid putting excessive stress on the load cell system, as when heavy weights are dropped on the platform. It is also important, especially in the case of large capacity platforms, that the platform not be impacted from the sides while there is a heavy load on the platform.
- It is normal for a small amount of zero drift to occur over short periods of time. For the most accurate readings, the scale may re-acquire a true zero by using the ZERO button just prior to weighing.

Battery Operation – Charging and Use

The MKE-5-IS Indicator was designed to use a high capacity, single C cell rechargeable battery. The indicator's low power design allows it to run approximately 50 hours on a single charge, even with four approved load cells attached.

Caution ***The rechargeable batteries used in this indicator have been approved by FM. The use of any other batteries violates FMs approval. Additional and replacement batteries must be purchased from Arlyn Scales.***

Safety Considerations – IMPORTANT!
In order for this indicator to be safely operated in a hazardous area, battery care, operation and maintenance must be fully understood before you start the installation.
This battery holder was designed specifically for use in hazardous environments. It contains an internal current limiting circuit whose function it is to restrict the amount of power that the unit can supply, even if its outputs are shorted together. The battery holder is highly impact resistant, and designed to keep gasses, dust and other foreign materials out. When replacing batteries you must ensure that there are no foreign materials inside the holder, and that the correct battery has been installed with the proper polarity.
FM requires that the battery holder be designed in such a way as to eliminate any possibility of the holder coming apart and ejecting the battery if the unit is dropped or impacted sharply. In order to maintain this integrity, the cover must be securely fastened after installing the battery. Do not over tighten. Hand tightening is satisfactory. Failure to do so may cause the unit to eject the battery if the unit is dropped. The battery must never be exposed while it is located in a hazardous area.

AT NO TIME WHATSOEVER SHOULD THE BATTERY COVER BE OPENED WHILE THE SCALE IS LOCATED IN A HAZARDOUS AREA. DOING SO WOULD VIOLATE THE INTRINSICALLY SAFE DESIGN, POSSIBLY CAUSING AN EXPLOSION RESULTING IN SERIOUS INJURY OR DEATH.

Battery Charging

Batteries can be recharged using any standard charger designed to charge a 3800 mah NiMH C cell. A charger is also available from Arlyn Scales. Most commercial chargers cannot charge a single battery so batteries are commonly charged in pairs.

Caution ***Do not attempt to remove the battery cover while the unit is located in a hazardous area. Doing so will violate intrinsic safety, possibly causing an explosion or fire resulting in death or serious*** **injury.**

To remove the battery, the indicator must first be moved to a safe area.

- Place the power switch in the OFF position.
- Disconnect the load cell cable from the upper right side of the indicator.
- Loosen the thumbscrew and slide the indicator housing off of the “L” shaped mounting bracket.
- Remove the indicator from the hazardous area.
- Once in the safe area, the battery may be removed and charged.
- Visually inspect the inside of the empty battery holder to ensure that there are no foreign materials inside. Also check to verify that there is no damage to any of the internal components.
- Insert a charged battery into the holder “PLUS” end first. Tighten the cover securely.

Load Cell Wiring

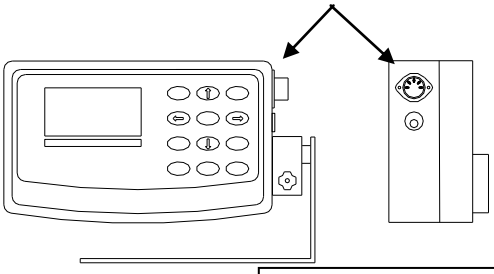
Caution

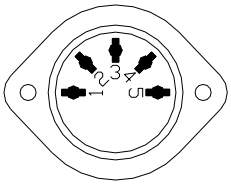
Only Arlyn, FM approved load cells may be used. The list of approved load cells is as follows:
520-10000L-IS, 520-5000L-IS, 520-5000-IS, 520-2500-IS, 520-1250-IS
320-500-IS, 320-250-IS
620-300-IS, 620-100-IS, 620-50-IS, 620-25-IS, 620-10-IS

The MKE-5-IS is equipped with a locking DIN connector on the upper right side of the housing for connecting load cells. In order for FM approval to be valid, the following must be adhered to:

- Only Arlyn, FM approved load cells may be used.
- Up to four of the cells from the above list may be connected to the scale.
- Multiple load cells must be wired in parallel.
- The type and length of connecting cables must conform to the control drawings.
- The maximum total cable length is **not to exceed 133ft!**
- Please consult control drawing 4013 for details on wiring, maximum lengths and obtaining extra, approved cable.

LOAD CELL CONNECTOR





PIN	FUNCTION	COLOR
1	+ EXCITATION	RED
2	- EXCITATION	BLACK
3	+ SIGNAL	GREEN
4	- SIGNAL	WHITE
5	NO CONNECTION	

Single Load Cell Resistance Readings

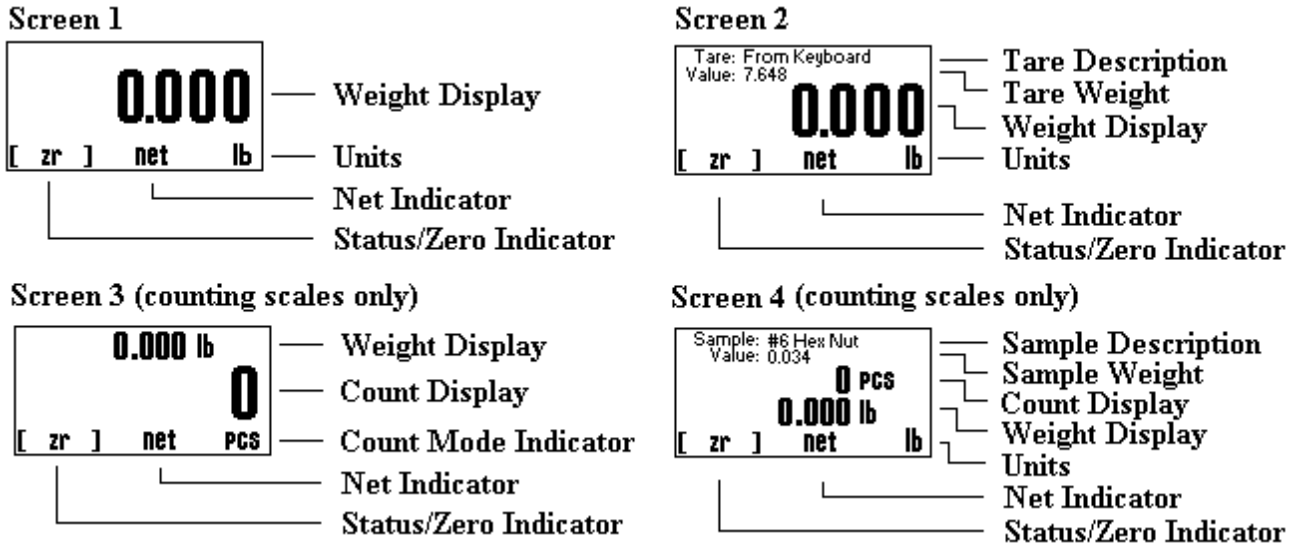
Each load cell will have the following internal resistances. There should be no continuity between the load cell frame and any wire.

WIRE	READING
Red to Black	4500 ohms +/- 10%
Red to White	3375 ohms +/- 10%
Red to Green	3375 ohms +/- 10%
Any color to frame	Infinity, open circuit

Controls and Indicators

Main Display Screen

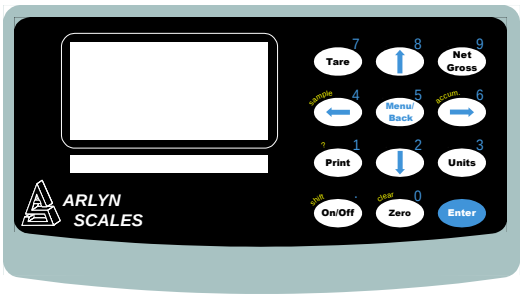
The scale is equipped with 128x64 LCD Graphics Display with a wide viewing angle and variable contrast. For normal operations, you have a choice of viewing weight information from two main screens. For parts counting scales, two more screens are available. You can switch screens by pressing the MENU key and then press ENTER to accept the “Next Screen” menu choice. Doing this will step through the screens shown below in order. For non-counting scales screens 3 and 4 are skipped.



WEIGHT DISPLAY	Shows the weight on the platform in the current units setting.
COUNT DISPLAY	Shows the current piece count on the platform. If there are any totals in the accumulate register it will indicate “pcs acc”
UNITS	Shows the active conversion units.
NET INDICATOR	Shows “Net” if the indicator is in net weighing mode.
STATUS/ZERO	Shows either “Zr” if the platform is at zero, a bar graph showing how close the scale is to maximum capacity or “Ouch!” if the platform is overloaded.
TARE DESCRIPTION	Shows the description of the active tare weight. If the tare was taken from the keyboard using the TARE key it will show “From Keyboard”.
TARE WEIGHT	Shows the weight value of the active tare.
SAMPLE DESCR	Shows the description of the active sample weight. If the sample was taken from the keyboard using the SAMPLE key it will show “From Keyboard”.
SAMPLE WEIGHT	Shows the weight value of the active sample.

Front Panel / Keyboard

The front panel has a twelve button, click touch key panel that allows easy menu navigation as well as full text and floating point entry.
The main scale functions are shown in black, menu navigation and floating point numeric entry keys are blue and the secondary functions are yellow.



Main Function Keys

ON/OFF	This key is not used on the MKE-5-IS. The power switch is located on the rear of the indicator.
TARE	Pressing this key will tare any weight on the platform and switch the scale to the net mode. Holding this key down will clear any active tare weight.
NET/GROSS	Will toggle the indicator between the net and gross mode. The net mode will show the weight on the platform minus any tared weight.
UNITS	Pressing this key allows you to step through the various conversions. By default, the conversions available are pounds, kilograms, grams and ounces. There are four other conversions available that can be activated in the setup menu. This will add troy ounces, pennyweights, grains and a user defined conversion to the list.
ZERO	Will zero the indicator.

Menu Navigation Keys

MENU/BACK	Using this key from the weight display will access the setup menu. In all other areas it is used to back out from menus or to complete an operation.
ENTER	This key is used to select items and to complete operations in the various menus.
ARROWS	Are used to navigate and select menu items.

Secondary Function Keys

SAMPLE	In counting scales is used to acquire a quick parts counting sample from the platform. Pressing and holding this key down will clear the active sample.
ACCUM	In counting scales is used to add the piece count to the accumulate register allowing the totaling of parts. Pressing and holding this key will clear the accumulate register.
? KEY	Can be used in various areas to call up help screens. In some areas this key needs to be pressed and held.
SHIFT	Used by the text-editing screen to toggle caps on/off.
CLEAR	Used in some editing screens to clear input lines and numbers. In some areas this key needs to be pressed and held.

NUMBER KEYS Are used in various places to input floating point numbers.

System Operation

Basic Menu Operation

The scale operating system uses a menu driven interface that is both intuitive and easy to use. To access the setup menu press the MENU/BACK key.

There are two basic menu types. The first is a simple list of items. To select an item in the list, use the UP and DOWN ARROW keys to line up on the desired item and then press ENTER.

The second type of menu is a horizontal list displayed along the bottom of the screen. These menu items indicate operations to be performed. To select one, use the RIGHT and LEFT ARROW keys to select the desired item and then press ENTER.

Horizontal menus may show a single or double headed arrow on the right side to indicate that there are more selections to the left and/or right that are not displayed.

Horizontal menus and lists are often used together to perform an operation on a specific item. For example, to delete a tare entry, use the UP and DOWN ARROWS to select the desired tare from the list, then use the LEFT and RIGHT ARROWS to select the menu item “DEL” in the horizontal menu. Pressing ENTER will perform the operation.
Selecting menu items will often lead to other menus, sometime drilling down several levels deep. Use the MENU/BACK key to back your way out. Continuing back will eventually bring you back to the top, which is the main weight display screen. Consult the menu tree in the back of the manual for help in navigating menus.

Tare Functions

The tare function allows you to temporarily remove from the display any weight that may be on the platform. Tare weights are often used in filling processes. For example, the user will place an empty box on the platform. The scale will indicate the weight of the box. The user then presses the TARE key. The scale will now indicate a weight of zero, and will switch to the NET mode. The box can now be filled. The scale will read out only the weight of the material. Switching to the GROSS mode will show the weight of the material plus the weight of the box. To clear any active tare, press and hold the TARE key.

Defining, Editing and Storing Tares

Tares can also be taken, named, activated and stored permanently through the setup menu. Go to menu SETUP MENU/TARES. A list of all tare definitions will be shown. To add a new tare, line up on NEW in the lower menu and then press ENTER. A new tare will be added to the list with the default description of Tare #XXX. The number XXX is assigned by the system by counting up the number of tares and then adding one. It is possible that after adding and deleting a few tares that two tares will have the same description. This is acceptable, albeit confusing, and the description can be changed later. This new default tare will have a weight value of 0.00 lb when first created.
Editing Tares
You can edit any tare by using the arrow keys to line up on it and the “EDIT” function in the lower menu and then press ENTER. The next screen will show the tare with it’s description and weight value in pounds. The lower menu allows you to change the description (“DESCR”), enter the value directly (“VALUE”) or acquire it automatically from the platform (“ACQUI”).
Deleting Tares
To delete a tare from the list simply line up on it and the “DEL” function in the lower menu. Press ENTER to delete it. Once a tare has been deleted it is removed permanently from memory.
Activating Tares
To activate a tare from the list, line up on it and the “ACTV” function in the lower menu, then press ENTER. The tare will be made active, the scale switched to NET mode and you will immediately be placed back in the weighing screen you were in when you accessed the setup menu.

Parts Counting Functions

The MKE-5-IS scale indicator is available with an optional parts counting function. The parts counting function enables you to count parts automatically on the platform. In order to be accurate, the parts you are counting must be of a consistent weight from piece to piece and be heavy enough to be detectable by the scale. Scales that have low maximum capacities can count very light parts while scales of heavier capacities can only count heavier parts. Attempting to count parts that are too light will case the indicator to drift and become non-repeatable.
Parts counting is actually a two step process, first the scale needs to know how much each part weighs. This is called sample acquisition. Second, the counting mode must be activated with the desired sample.
There are two ways to acquire a sample. One way is to take a quick sample on the platform from the front panel. The other way is to use the setup menu where samples can be taken, named, stored and activated in a similar manner as tares. Multiple platform scales have the distinct advantage of allowing you to take your sample on a low capacity platform (to get a very accurate sample) and do the actual counting on a large capacity platform.

Sample Acquisition

There are two methods for acquiring samples. First is the “Quick Sample” method and the second is to define a sample in the scale’s memory for permanent storage. In general the more parts that you use during your sample acquisition the more accurate your parts counting will be. Using a quick sample restricts you to sample sizes of 10, 25, 50 or 100 pieces. This is acceptable in many circumstances, especially when the parts are fairly heavy. Saving a sample in memory allows you to choose any size sample, and is far more accurate.

Quick Sample

The quick sample is limited to sample sizes of 10, 25 and 50 and 100 pieces, which is all that is required for many operations. To take a quick sample, press the SAMPLE key. The number 10 will be displayed. Press the LEFT ARROW until

the desired sample size is displayed, and then press ENTER. For best general accuracy use the largest convenient sample size.

Remove all weight, or place an empty container on the platform, and press ENTER.

Place the correct amount of parts on the platform and then press ENTER. The scale will now automatically switch to a counting screen.

Quick samples can not be stored for future use and will remain active only until the power is removed, a new sample is taken or the sample is cleared through the keyboard. Proceed to the section “Counting Parts”.

Defining, Saving and Editing Samples

Samples can be taken, named, activated and stored permanently through the PARTS COUNTING menu. Go to menu SETUP MENU/PARTS COUNTING. A list of all sample definitions will be shown. To add a new sample, line up on NEW in the lower menu and then press ENTER. A new sample will be added to the list with the default description of Sample #XXX. The number XXX is assigned by the system by counting up the number of samples already defined and then adding one. It is possible that after adding and deleting a few samples that two samples will have the same description. This is acceptable, albeit confusing, and the description can be changed later. This new default sample will have a weight value of 0.00 lb when first created.

Editing Samples

You can edit any sample by using the arrow keys to line up on it and the “EDIT” function in the lower menu and then press ENTER. The next screen will show the sample with it’s description and weight value in pounds. The lower menu allows you to change the description (“DESCR”), enter the value directly (“VALUE”) or acquire it automatically from the platform (“ACQUI”).

Deleting Samples

To delete a sample from the list simply line up on it and the “DEL” function in the lower menu. Press ENTER to delete it. Once a sample has been deleted it is removed permanently from memory.

Activating Samples

To activate a sample from the list, line up on it and the “ACTV” function in the lower menu, then press ENTER. The sample will be made active, and the scale switched to a counting screen. You can now zero the scale and begin counting that part.

Deactivating Samples

If you wish to clear a sample from memory, simply press and hold the SAMPLE key until it clears.

Counting Parts

With sample acquisition complete you may now count your parts. On the top of the counting screen is displayed the sample’s description (or “taken from keyboard” if a quick sample was used) and the actual piece weight. Start by emptying the platform or place an empty container on the platform and then press the ZERO key. Now place your parts on the platform and the count will be shown on the display.

*** NOTE *** You should always zero the platform with the ZERO key prior to counting parts.

Accumulate Function

Your scale has an accumulate function that will allow you to keep a running total of parts counted. To activate, place your parts on the platform and then press the ACCUM key. “Acc” will be shown on the display and the number of parts that were on the platform are added into the accumulate register. While in the accumulate mode the display will show what is in the accumulate register PLUS the number of parts on the platform.

To clear the accumulate register, press and hold the ACCUM key until it clears.

Text Descriptions

Many items carry descriptions, which can be changed at any time. These descriptions are useful in the case of tares and counting samples because the descriptions are shown on the display when activated, eliminating confusion. The scale itself also has a description and ID number that can be changed in the SETUP MENU/SYSTEM/SCALE DESCRIPTION menu. Further, there are text definitions that can be created and used in RS232 operations like label printing.

All of these text entries are fourteen characters in length and can be edited through the text-editing screen. When activated, the text is shown on the top of the screen with an arrow pointing at the first character. In the lower part of the screen is the entire character set with the current selection highlighted. The keys used for the editing are shown below.

ARROW KEYS	Use them to select a character in the lower list.
7 and 9 KEYS	Use these to position the arrow on the top line.
ENTER KEY	Changes the character above the arrow to the character selected in the list and then advances the arrow to the next position.
CLEAR KEY	Will clear the entire line and place the arrow in the leftmost position.
MENU KEY	Will complete the operation.

SHIFT KEY Selects either upper case or lower case characters.
? KEY On line help.

System Memory Allocation and Usage

The scale's memory is organized as 485 memory slots. The operating system uses ten of these for internal tasks and the setup for the default platform uses four. This leaves 471 slots available for user definitions that can take the form of tares, counting samples and other functions. Each definition uses memory differently and is outlined below:

DEFINITION	USAGE	DEFINITION	USAGE
Platform	4 slots	Print Frame	2 slots
Tare	1 slot	Text Def	1 slot
Counting Sample	1 slot	Setpoints	4 slots

For a detailed description on your current memory usage, access menu SETUP MENU/SYSTEM/MEMORY STATUS.

The System Menu

The system menu contains many useful features for checking and configuring your scale. To access, select menu SETUP MENU/SYSTEM. Each feature is outlined below.

Scale Description / Scale ID Number: Each scale can be assigned a unique description and ID number. This is useful for printing labels and other processes.

Udef Conversion Multiplier: Allows you to enter the multiplier (from pounds) for the user-defined conversion**.**

Auto Increment Weight Number: This number will increment each time the PRINT button is pressed. It can be useful in label printing and statistical operations. Its starting value can be set here.

Display Contrast: Allows you to adjust the contrast of the display for optimum viewing.

The use of low power levels within an intrinsically safe indicator may restrict the usable range of the contrast control.

Memory Status: Will give a detailed breakdown of memory slot usage and free memory available. The number indicated is the number of slots, not the number of definitions. Each definition uses memory differently. See the section above entitled "System Memory Allocation and Usage".

Display Update Speed: The display update speed can be adjusted from .1 to six seconds.

Startup Parameters:
The following startup parameters can be set here;

a) The startup screen and conversion units can be set here.
b) The "ready" prompt and the splash screen can be enabled/disabled. (Ready prompt is disabled in the MKE-5-IS)
c) Zero lock can be enabled/disabled. Zero lock disables the front panel ZERO key. When this function is enabled the user must press the ZERO and the PRINT key simultaneously to zero the scale.

Erase User Memory: The entire user memory can be erased at one time, if necessary, using this option. It will erase all user-defined tares, counting samples, text definitions, print frames and setpoints but will leave platforms and other system memory intact.

Auto Shut-Off: This option is not used on the MKE-5-IS scale indicator.

Infrared Communications Port

The MKE-5-IS can be purchased with an infrared communications interface allowing it to transmit data from the hazardous area to the safe area through any door glass or window. The nature of this concept makes the scale extremely easy to install in intrinsically safe situations because no wiring or electrical barriers are required to get the data to a safe area. A receiver module is then placed in the safe area to pickup the signal and convert it to whatever format is required. Available formats are RS232, USB, analog output and setpoint control.

To connect the IR transmitter to the scale, simply plug it into the IR Com Port jack located on the right side of the indicator. Adhere the other end to a door glass or window.

Configuration and Calibration

Platform Advanced Setup

The scale's operating system revolves around one or more platform definitions that are stored in memory, with most scales only having one weighing platform. Each platform is fully configurable as to it capacity, displayed resolution, filtering, calibration and many other parameters which will be outlined in detail below.
To access the platform setups press the MENU/BACK key to activate the setup menu. Select PLATFORM SETUPS from the menu and then press ENTER. If your scale has multi-platform capability then a list of platforms will be shown. The adding, deleting and selection of these platforms are similar to tares and parts counting samples. If your scale is a single platform type then you will be shown only the platform setup menu.

Description: A fourteen-character description can be assigned to the platform. The default description is "Plat#001".
Auto Setup: Auto Setup will erase all of the parameters for the selected platform and return it to the default state. It also erases the platform's span and cornering calibration. Auto setup is useful when the scale is first manufactured or when the user inadvertently changes a calibration parameter that adversely affects the scale and then forgets the calibration parameter or its original value.
Upon activation you will presented a selection of platform capacities and resolutions. Pick the appropriate entry and then press ENTER. Auto setup will be performed. A span calibration is now necessary.

Input Source: On the MKE-5-IS, the input source needs to be set to LC Channel 0.

Corner Calibration: Corner calibration is not applicable to the MKE-5-IS.

Span Calibration: Span calibration adjusts the platform's sensitivity so that the display reads correctly. A calibrated weight is required to perform this and the procedure is outlined below in the "Span Calibration" section.

Resolution-Overload: Each platform has the capability of displaying its reading in any of eight standard conversion units. Only four are enabled by default and the user can enable the rest. The conversion units that are automatically enabled are pounds, kilograms, grams and ounces. The remaining conversions are troy ounces, pennyweights, grains and a user defined conversion.
Each conversion unit's resolution can be set individually. To do this, select RESOLUTION-OVERLOAD from the platform menu. A list of conversions is displayed and each active conversion will have a check mark to its right.
Select the conversion you wish to modify and press ENTER. Use ACTV to activate/deactivate it, DPNT to change its decimal point location and CNT to change what the least significant displayed digit will count by. In the pounds configuration (the scale's native conversion unit) you can use OVRL to set the overload limit in pounds.
When setting resolution (DPNT and CNT) care must be taken not to exceed 5000 total displayed counts or a drifting reading may result. The maximum resolution is setup by default by auto setup but can be calculated easily by taking the scale's maximum capacity and dividing it by 5000. For example a 50 pound scale's resolution should be .01 pounds (50 / 5000 = .01).

Auto Zero: Auto zero determines how the platform will zero on power up. Selecting NONE will not perform any zeroing. Selecting AUTO ZERO will automatically zero out any weight on the platform and LAST ZERO will zero it to the value of the weight on the platform the last time the ZERO key was pressed.

Zero Tracking: A scale sitting for long periods of time without weight on the platform is prone to drift from zero due to temperature changes and a number of other factors. Generally this is not a problem and you can press the ZERO button to return the reading to zero before weighing. Zero tracking, when enabled, will detect small reading changes over time and correct the platform back to zero. Consult the service manual for details on setup and configuration.

Software Filter: The raw internal reading from the load sensor contains electronic noise and other factors that can cause the reading to drift and be non-repeatable. All electronic scales incorporate some sort of filtering to compensate for this. Another use for filtering is to help stabilize a scale when it is used on a surface that is vibrating, in windy conditions, when subjected to RF interference or when used on a noisy power line. Your scale has two stages of filtering. The first is a electronic filter that is permanently enabled and the second is the software filter which is fully configurable.
In general, a low degree of filtering will cause the scale to be quick to react but prone to noise and vibrations. Heavy filtering will eliminate the noise and vibrations but the platform will react slowly to changes in weight. We have by default set up the optimum filtering parameters for general use. These should only be changed in extreme circumstances. The procedure is outlined in the service manual.

Calibration and Troubleshooting

Your scale has been precisely calibrated at the factory before shipping. It has the capability to adjust its own calibration to a certain degree to compensate for aging electronics, and temperature changes. This being the case, it is possible that you will never have to calibrate the scale. Doing so may leave you with a worse calibration than you started with. Does your scale really need to be calibrated? If so what steps are needed? Follow the steps outlined below to help make this determination.

Scale reads zero and will not move.

- Make sure that any and all shipping screws are removed from the platform.
- On platform scales, check that all four level legs are contacting solidly against the floor.
- If level legs are screwed in all the way then the stud from the level leg may be contacting the underside of the platform not allowing the load sensor to flex.

Scale reading is fluctuating wildly.

- Low battery condition
- Scale must be on a non-vibrating surface. Breezes may affect scales of lighter capacities.
- Electric motors, computers and other devices may cause interference and scale readings to fluctuate.
- Check to see if the cable from the platform to the indicator in plugged in properly. If so then remove the plug temporarily to check for bent or missing pins.
- Check for nicks or cuts on the platform cable.

Scale reading is different on different areas on the platform?

- On platform scales, check that all four level legs are solid against the floor. If a level leg is screwed in all the way then the stud from the level leg may be contacting the underside of the platform not allowing the load sensor to flex.
- Check for any mechanical interference. Is there anything rubbing against the platform?

Scale corners properly but does not indicate the correct weight.

- On platform scales check that all four level legs are solid against the floor.
- Check for any mechanical interference. Is there anything rubbing against the platform?
- Perform span calibration.

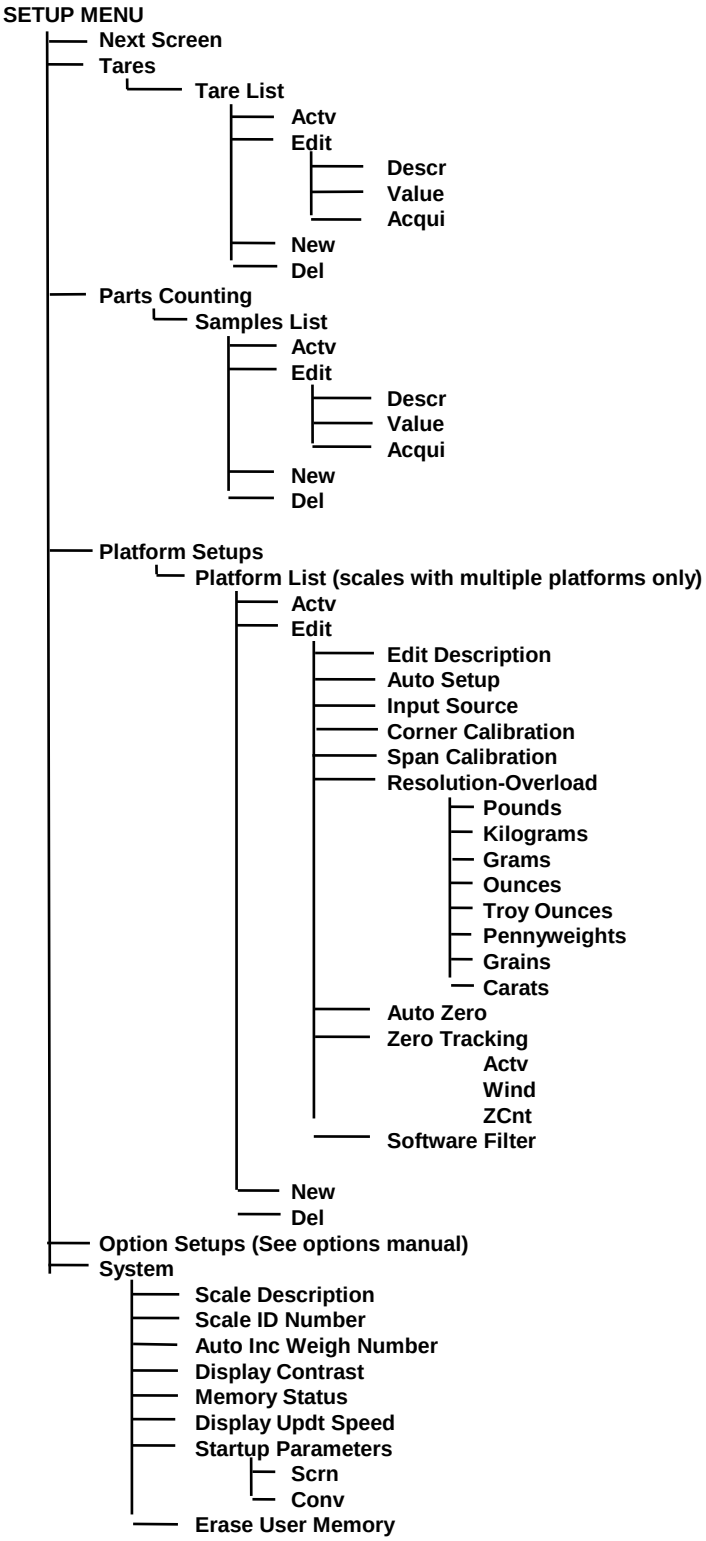
Span Calibration

Span calibration is used to set the internal gain of the indicator so that it reads correctly. A calibrated weight is needed in order to perform a span calibration. Any weight may be used within the capacity range of the scale but a weight of 50% of capacity is recommended. Using weights of less than 10% of capacity is not recommended and may lead to an inaccurate calibration.
To start the procedure access menu SETUP MENU/PLATFORM SETUPS/SPAN CALIBRATION. The scale will prompt you for the value of the calibration weight in pounds. Enter the value through the keyboard and then press ENTER. Next, you are asked to remove all weight from the platform. When the weight is removed press ENTER. Now place the calibration weight on the center of the platform, pause a second for the scale to stabilize then press ENTER. The scale will now calibrate itself automatically and return you to the platform menu.

During span calibration a small number will be displayed in the upper left-hand corner. This number represents the raw unadjusted reading from the load cell and is not calibrated in any way. It is there only to confirm that the platform is operating properly. The number should increase when weight is applied to the platform.

Menu Tree Diagram

The following menu tree will help you navigate through the various system menus.



Specifications – Model MKE-5-IS (-C)

Power Requirements	Single 3800mah NiMH C cell battery (MAHA l# MH-C380 Avail. only from Arlyn Scales)
Accuracy	0.1% of full scale
Leveling	Adjustable
Tare Range/Zero Range	100% Full scale
Electronics	32 bit RISC microprocessor incorporated on one board
Display	LCD graphics display module
Display Speed	Adjustable from .1 to six seconds
Overload Condition	Displayed warning at 102% of scale capacity. 150% by mechanical stops
Operating Temperature	14F to 104F / -10C to 40C
Construction	Indicator housing is made from impact resistant nylon. Platforms are constructed from either diamond plate steel, aluminum or stainless steel depending on model.
Load Cell	Stainless steel construction for reliability.
Controls	Units conversion, Net/Gross, Tare, Zero with secondary functions
Overall Dimensions	Indicator dimensions are 8W x 4.8W x 2.5D.
Options Available	IR communications interface, IR receiving module for safe area operation containing RS232, Analog or setpoint outputs.

Limited Warranty

Arlyn Scales warrants that your Arlyn Scales equipment and systems, when properly installed will operate per written specifications. All systems and components are warranted against defects in materials and workmanship for a period of one year.

Arlyn Scales warrants that the equipment sold hereunder will conform to the written specifications authorized by Arlyn Scales. Arlyn Scales warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, Arlyn Scales will, at their option, repair or replace such goods returned within the warranty period subject to the following conditions:

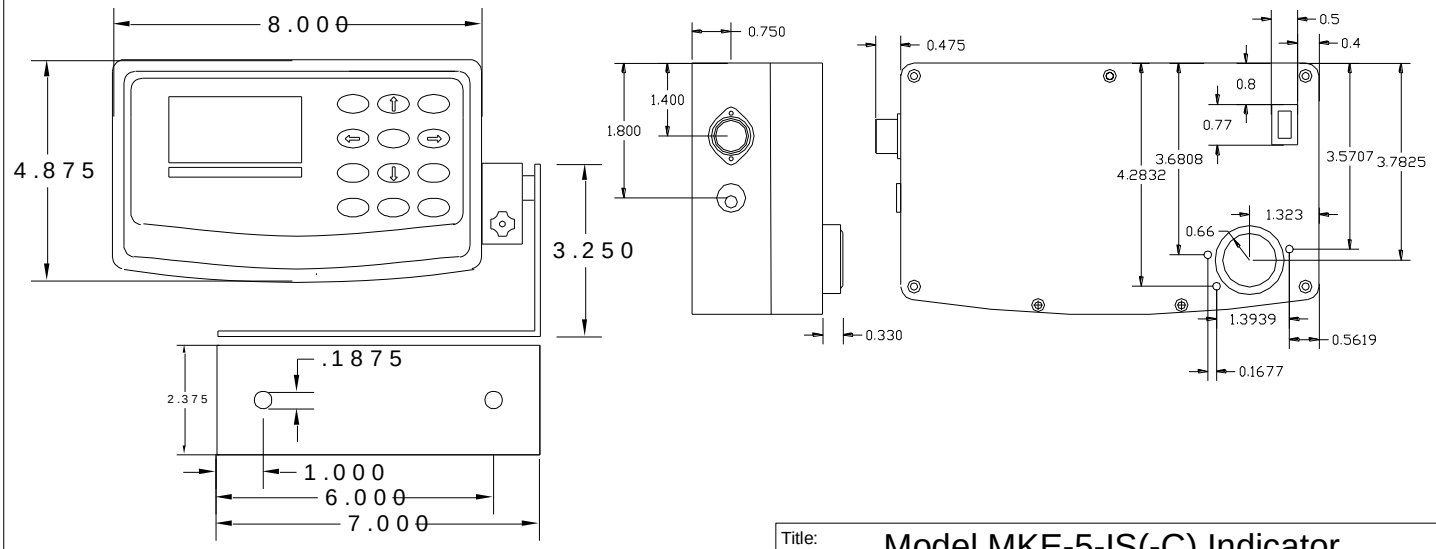
- Upon discovery by Buyer of such nonconformity, Arlyn Scales will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to Arlyn Scales for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment.
- Examination of such equipment by Arlyn Scales confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; Arlyn Scales will be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered or changed by any person other than Arlyn Scales.
- Arlyn Scales will have reasonable time to repair or replace the defective equipment. The buyer is responsible for shipping both ways.
- In no event will Arlyn Scales be responsible for travel time, or on-location repairs, including assembly or disassembly of equipment, nor will Arlyn Scales be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ARLYN SCALES WILL NOT, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.
ARLYN SCALES AND BUYER AGREE THAT ARLYN SCALES SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.
SHOULD THE SELLER BE OTHER THAN ARLYN SCALES, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.
NO TERMS, CONDITIONS OR UNDERSTANDING, OR AGREEMENTS PURPORTING TO MODIFY THE TERMS OF THIS WARRANTY SHALL HAVE ANY LEGAL EFFECT UNLESS MADE IN WRITING AND SIGNED BY A CORPORATE OFFICER OF ARLYN SCALES AND THE BUYER.

Control Drawings

The following drawings, required for the installation of the MKE-5-IS Scale System, are listed below and are included on the following pages.

Doc No	Sheet No	Title
4010	1	MKE-5-IS(-C) General Dimensions
4013	1	MKE-5-IS(-C) Intrinsically Safe Scale System, Installation and Wiring Diagram
4011	1	MKE-5-IS(-C) Indicator Label Drawing
3015	1	Approved Load Cells, Label Drawing



*** NOTES ***
All units are in inches unless otherwise noted.

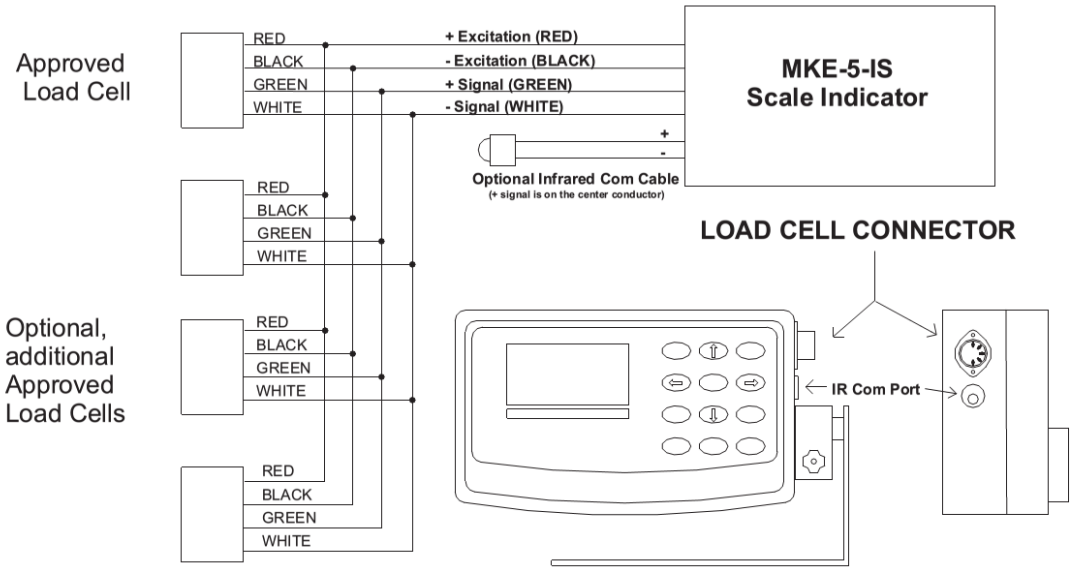
The IR jack located on the right side of the unit is only used in C models.

Title: Model MKE-5-IS(-C) Indicator General Dimensions

*** NOTE ***
This is a Factory Mutual approved document. No Modifications may be made without prior approval from Factory Mutual.

DocNo: 4010 **Sheet 1 of 1** **Rev. 1.01**

HAZARDOUS AREA



CABLE TYPES AND MAXIMUM LENGTHS

All external wiring for the load cell(s) and/or communications interface MUST use a specific cable obtained from Arlyn Scales.

The communications interface cable is available complete with connector. Its length may be specified when ordering.

Load cells are supplied with a connecting cable already attached. Cable may be obtained from Arlyn Scales to increase its length, or to use as wiring in multiple load cell applications.

WARNING-MAXIMUM CABLE LENGTHS

The maximum cable length is **not to exceed 133 feet**. This is the sum of all cable lengths, including the original load cell's connecting cable(s), the IR communications interface cable, and all interconnecting wiring.

Exceeding the maximum total length of 133 feet will impair intrinsic safety, violate FM approval, and will render the unit incapable of being used safely in a hazardous environment.

WARNING - BATTERY REMOVAL

DO NOT OPEN BATTERY COVER IN A HAZARDOUS AREA. TO RECHARGE BATTERY, MOVE THIS ENTIRE SCALE INDICATOR TO A SAFE AREA, REMOVE THE BATTERY AND RECHARGE. AFTER CHARGING, PLACE BATTERY IN ITS HOLDER AND TIGHTEN THE COVER BEFORE RETURNING TO A HAZARDOUS AREA.

WARNING - STATIC ELECTRICAL CHARGES

To avoid the possibility of static buildup, the indicator housing MUST NOT be rubbed or cleaned with a dry cloth.

HAZARDOUS AREA APPROVALS

This system, when installed in accordance with this document, has been approved by Factory Mutual for use in the following hazardous areas:

Class I, II, III, Division 1, Groups A, B, C, D, E, F & G
Class I, Zone 0, AEx ia IIC (T3 Ta=60C)
Indoor Hazardous (Classified) Locations.
Nonincendive for use in Class I, Division 2, Groups A, B, C and D
Suitable for use in Class II, Division 2, Groups F & G, Class III, Division 2 indoor Hazardous (Classified) Locations.

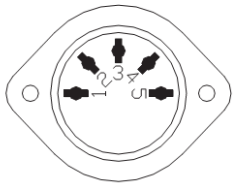
APPROVED LOAD CELLS

The MKE-5-IS Scale System has been rated as intrinsically safe by Factory Mutual when used with approved Arlyn load cells from the following list.

520-10000L-IS, 520-5000L-IS
520-5000-IS, 520-2500-IS, 520-1250-IS
620-300-IS, 620-100-IS, 620-50-IS, 620-25-IS, 620-10-IS
320-500-IS, 320-250-IS

*** **NOTE** ***

A maximum of **FOUR** Arlyn FM Approved Load Cells may be connected. They must be wired in parallel as shown.

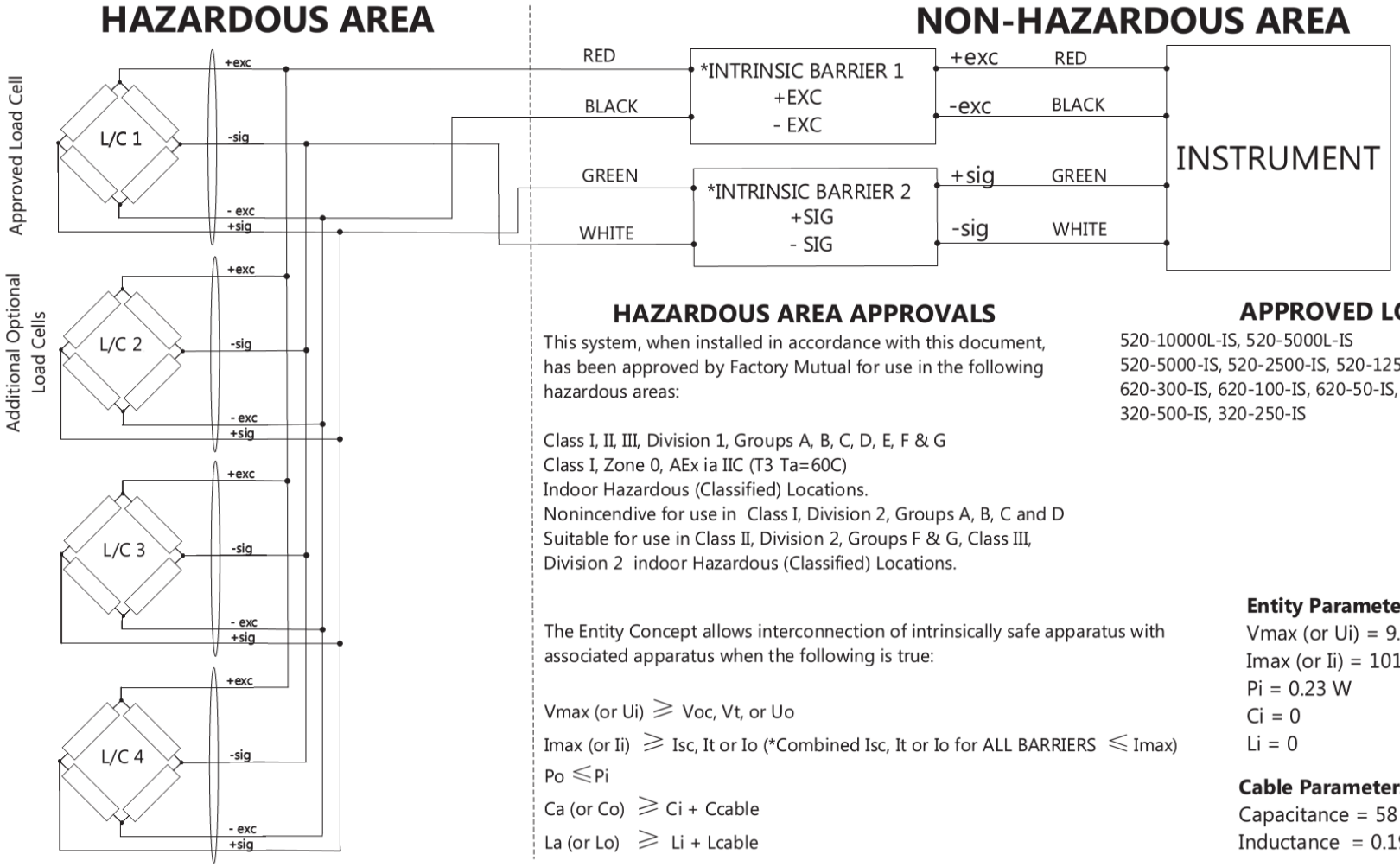


PIN#	COLOR	DESCRIPTION
1	RED	+ EXCITATION (3.3 VDC)
2	BLACK	- EXCITATION
3	GREEN	+ SIGNAL
4	WHITE	- SIGNAL
5		NO CONNECTION

Title: **MKE-5-IS (-C) Intrinsically Safe Scale System Installation and Wiring Diagram**

*** NOTE ***
This is a Factory Mutual (FM) approved document. No revisions can be made to this drawing without prior Factory Mutual approval.

DocNo: 4013 **Sheet 1 of 2** **Rev. 1.05**



HAZARDOUS AREA APPROVALS

This system, when installed in accordance with this document, has been approved by Factory Mutual for use in the following hazardous areas:

Class I, II, III, Division 1, Groups A, B, C, D, E, F & G
Class I, Zone 0, AEx ia IIC (T3 Ta=60C)
Indoor Hazardous (Classified) Locations.
Nonincendive for use in Class I, Division 2, Groups A, B, C and D
Suitable for use in Class II, Division 2, Groups F & G, Class III, Division 2 indoor Hazardous (Classified) Locations.

The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus when the following is true:

Vmax (or Ui) $\geqslant$ Voc, Vt, or Uo
Imax (or Ii) $\geqslant$ Isc, It or Io (*Combined Isc, It or Io for ALL BARRIERS $\leqslant$ Imax)
Po $\leqslant$ Pi
Ca (or Co) $\geqslant$ Ci + Ccable
La (or Lo) $\geqslant$ Li + Lcable

APPROVED LOAD CELLS

520-10000L-IS, 520-5000L-IS
520-5000-IS, 520-2500-IS, 520-1250-IS
620-300-IS, 620-100-IS, 620-50-IS, 620-25-IS, 620-10-IS
320-500-IS, 320-250-IS

Entity Parameters:
Vmax (or Ui) = 9.1 V
Imax (or Ii) = 101 mA
Pi = 0.23 W
Ci = 0
Li = 0

Cable Parameters:
Capacitance = 58 pF/ft
Inductance = 0.19uH/ft

NOTES:

1. No revision or drawing without prior FM Approval
2. Maximum number of FOUR (4) load cells can be connected in parallel as shown in the diagram.
3. Installations in the U.S. should be in accordance to with should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the latest edition of the National Electrical Code (ANSI/NFPA 70). Resistance between Intrinsically Safe Ground and earth ground must be less than 1.0 ohm.
4. Install Intrinsic Safe barriers in accordance with barrier instructions.
5. Apparatus connected to the system shall not use or generate voltage greater than 250V.
6. Associated apparatus must be FM Approved.

Title: **Intrinsically Safe Load Cells Installation and Wiring Diagram.**

*** NOTE ***
This is a Factory Mutual (FM) approved document. No revisions can be made to this drawing without prior Factory Mutual approval.

DocNo: 4013 **Sheet 2 of 2** **Rev. 1.05**

Approval Label Text

Arlyn Scales, East Rockaway, NY FM APPROVED
Model: MKE-5-IS **Serial:**

INTRINSICALLY SAFE FOR USE IN THE FOLLOWING AREAS
(when installed per Control Drawing 4013)
Class I, II, III, Division 1, Groups A, B, C, D, E, F & G
Class I, Zone 0, AEx ia IIC T3 Ta = 60C
Indoor Hazardous (Classified) locations. Temp Code T3C @ 40C Max Ambient, Temp Code T3B @ 60C max ambient.

Nonincendive for use in Class I, Division 2, Groups A, B, C and D
Suitable for use in Class II, Division 2, Groups F & G
Suitable for use in Class III, Division 2 indoor Hazardous (Classified) locations. Temp Code T6 @ 60C Max Ambient

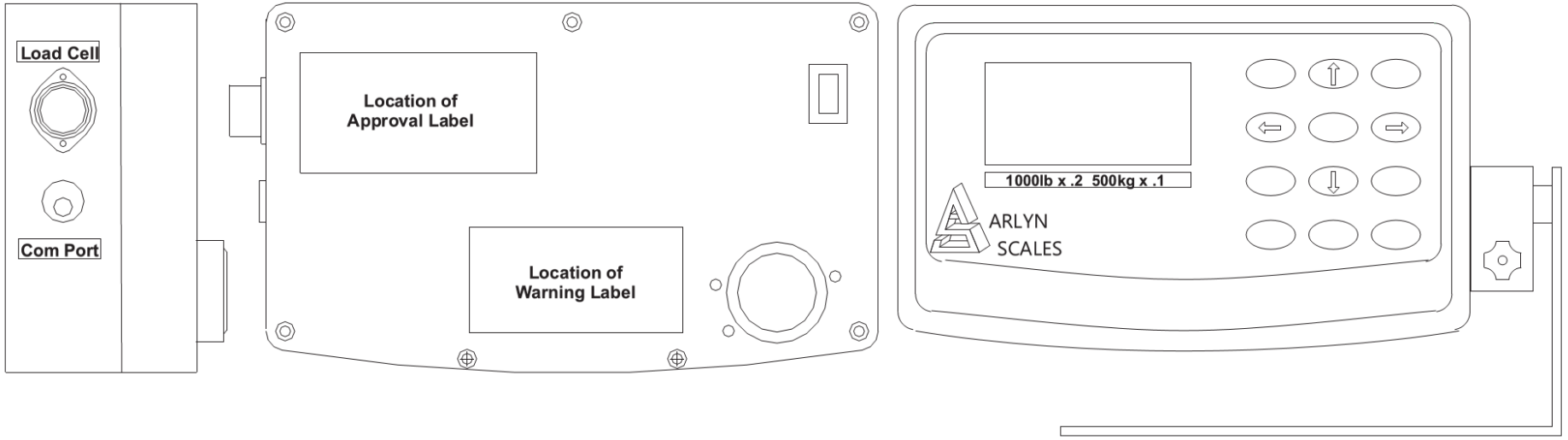
Warning Label Text

WARNINGS

DO NOT OPEN BATTERY COVER IN A HAZARDOUS AREA. TO RECHARGE BATTERY, MOVE THIS ENTIRE SCALE INDICATOR TO A SAFE AREA, REMOVE THE BATTERY AND RECHARGE.. AFTER CHARGING, PLACE BATTERY IN ITS HOLDER AND TIGHTEN THE COVER BEFORE RETURNING TO A HAZARDOUS AREA.

TO AVOID THE POSSIBILITY OF STATIC BUILDUP, THIS HOUSING MUST NOT BE RUBBED OR CLEANED WITH A DRY CLOTH.

SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY OR SUITABILITY FOR DIVISION 2.



*** NOTES ***
There are two labels, an Approval Label and a Warning Label. Both labels must be present on the rear face of the indicator as shown.

Title: Model MKE-5-IS(-C) Label Drawing

*** NOTE ***
This is a Factory Mutual approved document. No revisions can be made to this document without prior Factory Mutual approval.

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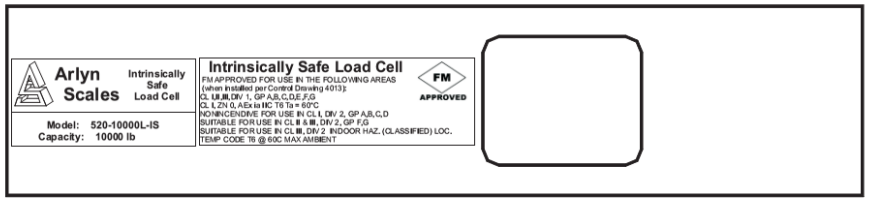
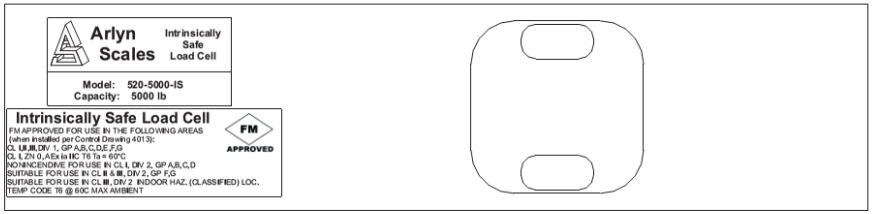
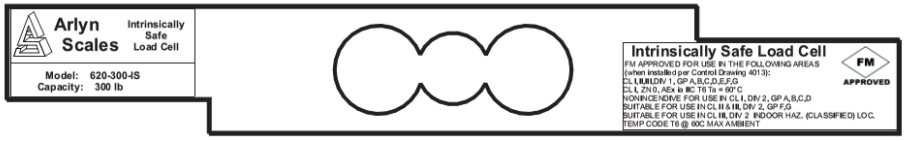
Model numbers 520-10000L-IS and 520-5000L-IS



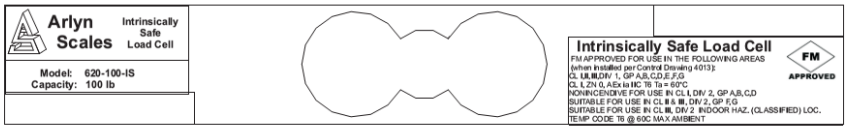
Model numbers 520-5000-IS, 520-2500-IS, 520-1250-IS



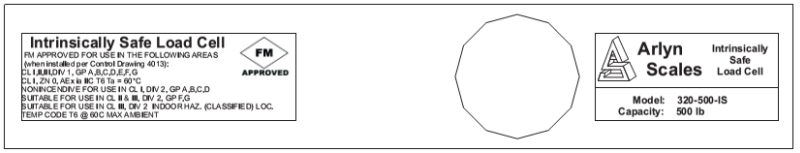
Model number 620-300-IS



Model numbers 620-100-IS, 620-50-IS, 620-25-IS, 620-10-IS



Model numbers 320-500-IS and 320-250-IS



NOTES:

There are two labels per load cell. Both labels must be present on each load cell in order for the FM approval to be validl.

The FM approval label is the same for all five load cell types.

The Model/Capacity Label is different for each Load cell type.

Title:

Intrinsically Safe Load Cells Label Drawings

*** NOTE ***
This is a Factory Mutual approved document. No revisions can be made to this document without prior Factory Mutual approval.

DocNo: 3015 **Sheet 1 of 1** **Rev. 1.03**