MMP

DIMENSIONAL MEASURING MACHINE USER MANUAL

Version 20230201

kentuckygauge.com

Table of Contents

1. Technical Specifications

Resolution	0.001”, 0.01mm, 1/64”
Accuracy	±0.001” per foot of measure
Repeat accuracy	±0.001”
Operating temperature range	32°-122°F
Protection level	IP60 DRO (front) IP67 scale
Max measuring speed	16 feet per second
Power supply	(1) C battery
Jaw size	3.375” x 2.50”

This MMP has been tested by Kentucky Gauge to meet or exceed the performance specifications listed above in accordance with length measuring equipment traceable to master standards at the National Institute of Standards and Technology (NIST). The specific calibration sheet for this MMP has been inserted as the final page in this manual for your records.

2. Safety Instructions and Obligations

2.1. General safety

Operators of the MMP should always be cognizant of their surroundings. As a check fixture, the MMP may be in the vicinity of many hazards that require the operator's attention. Additionally, these machines may be used to measure heavy parts and general precautions should be taken to minimize the chances of crushing or pinching hazards between the jaws, the item be measured and the jaws, or the item to be measured and the guide rail. In addition to these safety concerns specific to the MMP, all shop and/or organizational safety rules should always be followed while working with your MMP.

2.2. Owner obligations

The owner agrees to only allow the measuring machine to be used by qualified and trained persons who have read and understand this instruction manual.

2.3. Operator obligations

Before operating, all persons working with this gauge agree to familiarize themselves with the machine and this instruction manual. Each operator is responsible for following all safety guidelines and for the safe and proper operation of the MMP.

2.4. Intended use

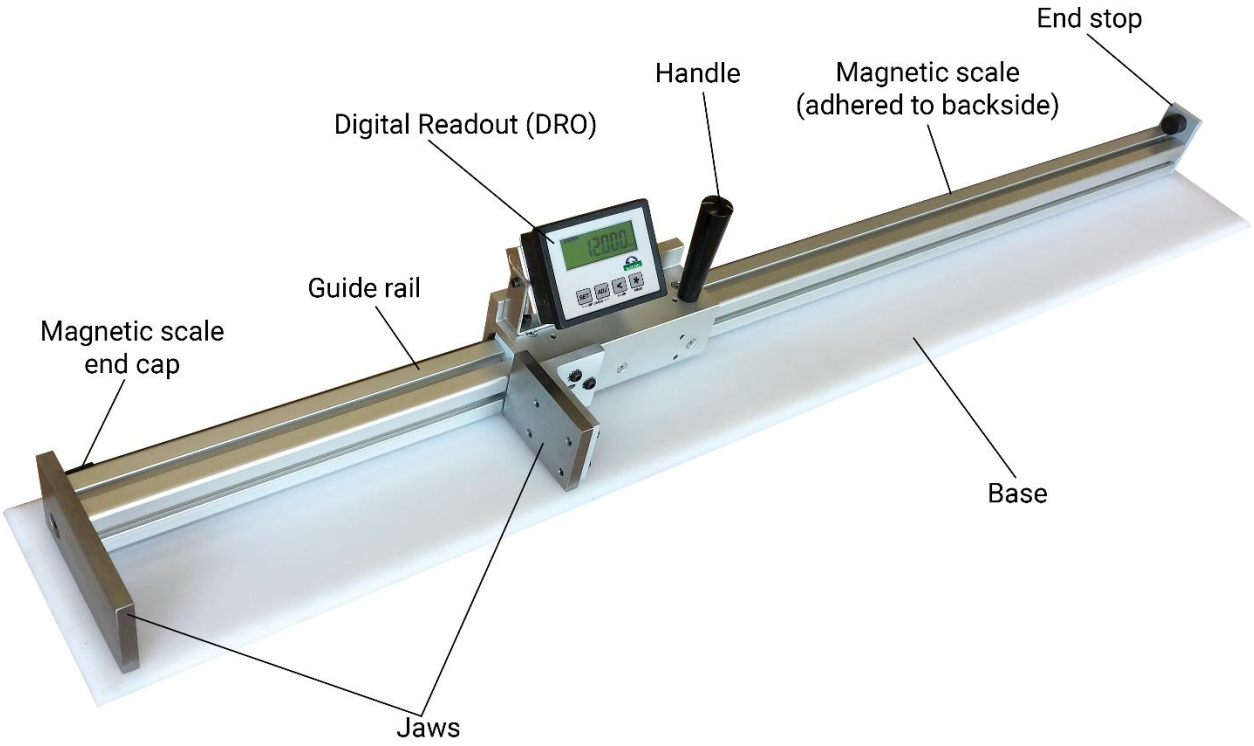
The only acceptable use for the MMP is as a measuring system. Any other use is not intended and is a misuse of the measuring system. Hymark is not liable for any damages resulting from misuse.

Intended use also means:

-Following all safety precautions mentioned in this manual

-Following the maintenance and inspection procedures as mentioned in this manual

3. Component Identification



Note: DRO is powered by (1) C battery. The battery will need to be replaced approximately every 9-12 months depending on use and battery capacity. An industrial grade battery is recommended for maximum battery life.

An inactivity timer can be set to automatically power off display. Refer to the Menu 2 parameter list in Section 8 for timer settings. The timer setting will leave the microcontroller powered on to maintain accurate positioning.

4. Maintenance Requirements

4.1. Maintenance schedule

See Section	Component	Clean	Lubricate	Adjust
4.3	Guide Rail	X	--	--
4.4	Magnetic Scale	X	--	--
4.5	Carriage	X	--	--
4.6	Jaws	X	X	O
4.7	Sensor	X	--	O

Legend: X – Daily O – As needed -- Not required

4.2. Lubricants and detergents

Detergent

- Use commercially available detergents
- Don’t use any acids or alkaline solutions
- Don’t use any high-pressure water jet cleaners

Lubricant

- The recommended lubricant is 3-IN-ONE® oil or equivalent

4.3. Guide rail

Remove chips, grease and any other items that would be deemed in the pathway of, or cause an unwanted obstruction to, the carriage. This should be done several times per day if the machine is in heavy use.

4.4. Magnetic scale

The magnetic scale is what the sensor reads to produce the measurements on the MMP. It is located on the backside of the guide rail and should periodically be cleaned and checked for damage.

- Remove chips and grease on the magnetic scale and between the sensor and scale. This should be checked daily to ensure there is no development of debris or obstructions. If heavy chip or debris accumulation occurs, increase frequency to accommodate suitable maintenance measures.
- The sensor-to-scale gap should be within the range of 0.003” to 0.030” (sensor gap and alignment covered more in depth in section 4.7).

Chemical Resistance

Acetone	**	*Ketone*	***
Acetylene	**	*Mineral oil*	*
Benzene	***	*Seawater*	**
Gasoline	**	*Steam heat*	*
Heptane	***	*Thinner*	***
Kerosene	*	*Turpentine*	**
* - Little-to-no effect ** - Low-to-moderate effect ***- Severe effect			

4.5. Carriage

- Remove chips, grease and any items on the measuring surface that would be deemed in the pathway of, or cause an unwanted obstruction to, the carriage or jaws. This should be done several times per day if the machine is in heavy use.
- Ensure that the hardware connecting the jaws to the carriage is secured. This may be checked on a quarterly basis or implemented in line with the standard preventative maintenance schedules for the other equipment in the facility.

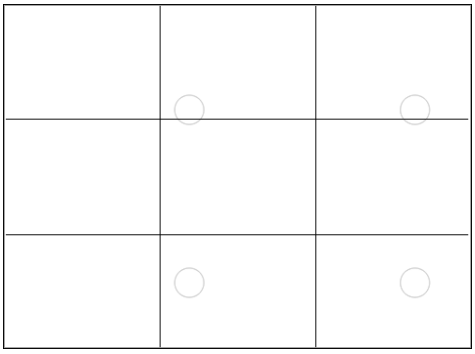
4.6. Jaws

Cleaning

- Wipe down jaws and remove any dirt, grime, or moisture
- Apply a liberal coat of lubricant to every exposed surface of the jaws to prevent corrosion

Adjusting

From the factory, the parallelism of the jaws is set to be ±0.001” across 9 points on the jaws. To maintain accuracy, parallelism of the jaws must be maintained at this specification and should be checked periodically. A ball gage is recommended to check the distance between the jaws at 9 points shown on the smaller jaw face below. The circles on the diagram depict the mounting screw holes. Be sure that when taking measurements, the ball gage is not resting in one of these holes. In the event the measurement at any of these points is off by more than ±0.001”, the jaws should be squared to maintain the machine’s accuracy. There are adjustment procedures for coarse and fine adjustment. If the measurements vary by ±0.005” or more, begin with the coarse adjustment. If not, skip ahead to fine adjustment.



The grid to the left divides your MMP jaw in to 9 sections. Take a measurement at the center of each of these sections, being sure not to take measurements with your ball gage in one of the mounting screw holes.

In order to adjust the jaws on your MMP, you will need a 2.5mm and a 4mm hex key. If your MMP needs coarse adjustment, you will also need something to clamp the jaws together. (A small locking C-clamp, as shown, is recommended [figure 2, page 8].)

Coarse adjustment

1. With the 4mm hex key, slightly loosen the four mounting screws holding the smaller jaw to the carriage bracket (figure 1).
2. Clamp the two jaws together using the hole in the center of the bracket as shown, being careful to avoid clamping the bracket as well. While tightening the clamp, align the top and outside edge of the jaws (figure 2).
3. Run the set screws in using the 2.5mm hex key until they lightly touch the jaw.
4. Tighten the mounting screws to 20 in/lbs and recheck parallelism of the jaws.

Fine adjustment will most likely be necessary, but if everything falls within the specification of ±0.001” across the 9 points, you are finished adjusting and can reference your MMP to begin measuring.

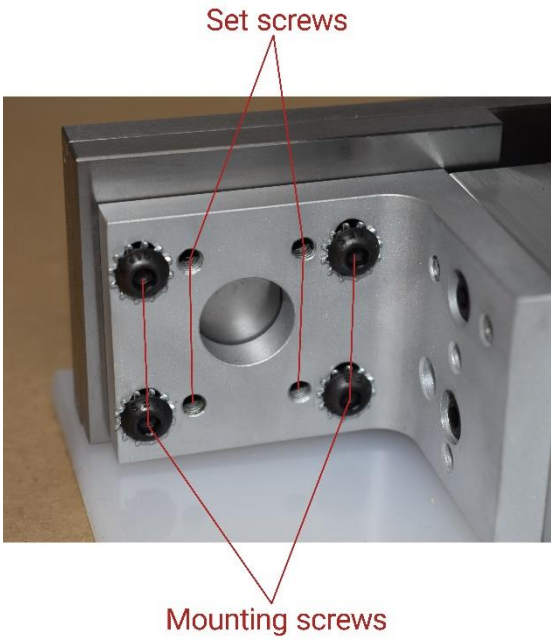


Figure 1

Figure 2

Fine adjustment

1. Check the jaws at the 9 points again and record the measurements. Start at the point with the lowest measurement and tighten the corresponding set screw very slightly (approximately 10-15 degrees at a time). If you have to tighten a set screw more than a half turn, back the mounting screw out and re-torque the nearest mounting screw to 20 in/lbs.
2. Recheck the measurement at that point and the adjacent points.
3. Continue checking the 9 points and adjusting the set screws accordingly until all points measure ±0.001”.

Note: At no point should any of the screws be overly tightened. Over tightening the mounting screws may cause the jaw to bow and prevent you from getting the parallelism of the jaws into spec. Mounting screws should be tightened to a torque of 20 in/lbs.

4.7. Sensor alignment

Figure 3, below, depicts the proper sensor alignment for accurate measuring. The sensor and bracket should be tight, the sensor should be level with the scale, and there should be a uniform distance between the sensor and the scale (dimension D, figure 3) of 3 to 30 thousandths of an inch (0.003”-0.030”). If the sensor does not meet these criteria, follow the steps below to adjust it.

1. Loosen the sensor mounting screws slightly (figure 4).
2. Loosen the bracket mounting screws slightly (figure 4).
3. Pull the sensor up tightly to the top of the window machined into the carriage and tighten the bracket mounting screws.
4. Insert a feeler gauge with a thickness within the acceptable gap range between the sensor and the scale. Be sure that the feeler gauge is inserted far enough to maintain the proper gap throughout the full length of the sensor.
5. Push in the sensor so that it touches the feeler gauge and continue holding in on it as you tighten the sensor mounting screws.
6. Remove the feeler gauge from between the sensor and the scale
7. Using a set of verified length standards or gauge blocks, check various measurements to see if the MMP is now measuring within spec.

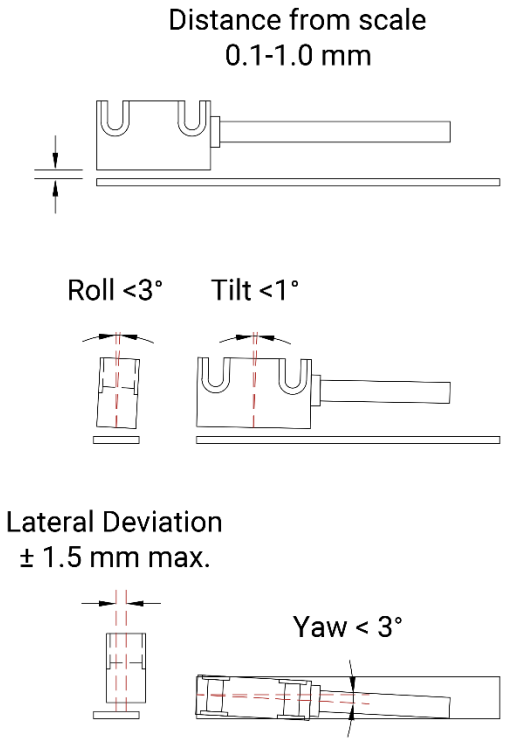


Figure 3

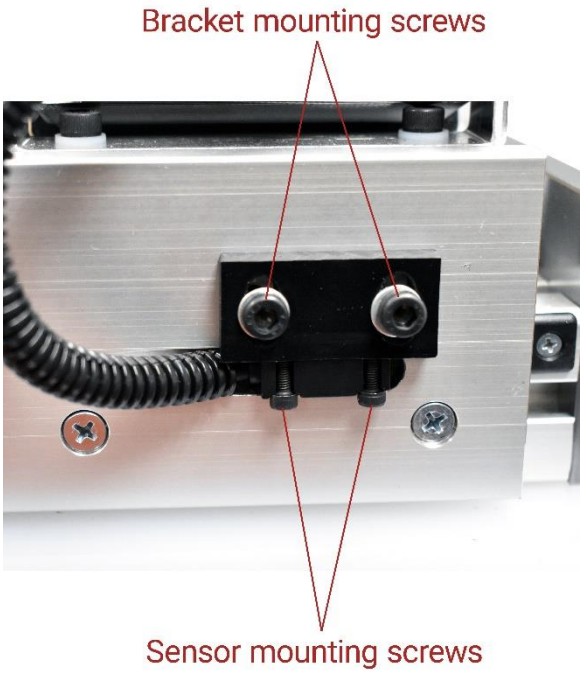


Figure 4

5. DRO Operation

5.1. DRO button identification

SET: Set (programming/change parameters)

ADJ: ADJ (increase value of selected digit)

<: Shift cursor left (select digit)

*: Save (save data)

5.2. Restoring factory parameters

If DRO parameters are inadvertently changed and you need to reset them, use the following procedure to restore the factory parameters:

- Hold down SET for 3 seconds to enter parameter mode, the DRO should display “SETUP”
- Press ADJ, the DRO should display “Unit”
- Press SET again to begin setting parameters back to default
- To navigate through the parameters:
    - Press SET to scroll from one parameter to the next
    - Press SET a second time and the current parameter value will flash on the display
    - Press ADJ to change the value for that item
    - When the correct value is set, press * to save
    - Press SET to move on to the next parameter
- Continue following these steps to set each parameter until you have made it through all parameters. After the final parameter, the DRO will return to its home screen. The MMP can now be referenced then you are ready to measure.

The table below contains the factory default values:

Parameter	***Value***
Unit	1dEc
rES	0.001
dir	uP
F_nn1	yES
F_rEL	No
F_rST	yES
F_rEF	yES
rEF	000.000
F_oFS	No
rESET	No rSt

Note – For more explanation as to what other parameter options do to the machine, see the parameters list at the end of this manual (section 7).

5.3. Setting the datum

The datum is the value that the DRO resets to when referencing the MMP. From the factory, the datum value is set to 0. If you prefer to zero your MMP as you would handheld calipers (by bringing the jaws together and resetting to 0), there is no need to adjust the datum. If you would prefer to reference the system to a verified length standard or gauge block, you can set the datum to the measurement of that length standard or gauge block. To change the datum:

- Press SET and ADJ on the DRO simultaneously (the datum value will begin flashing)
- Use < to move through the digits (selected digit will flash) and ADJ to change the value for that digit
- Once you have the DRO showing the desired datum, press ✱ to save the changes and SET to return to the measurement screen
- Now, when you reference your MMP, it will reset to the datum instead of to 0

Note – If pressing SET and ADJ simultaneously does not take you to the screen to change the datum, enter the parameters menu (as detailed in section 5.2) and make sure “f_rEF” is set to “yES”.

If you prefer to always zero your MMP, this value should be left at 0.000.

5.4. Referencing the system/zeroing the system

Referencing the system refers to resetting the DRO to the datum value. This is similar to the process of zeroing a pair of calipers or a micrometer except the MMP allows the operator to change the datum value that the MMP can be referenced to.

- Hold down ✱ until the DRO displays “rESEt”
- Press the ✱ button again, the current measurement will begin to flash
- Place your length standard or gauge block consistent with your datum value on the measuring surface (if you are zeroing your MMP, skip this step)
- Bring the jaws together until the standard sits tightly against both jaws (if you are zeroing your MMP, close the jaws, ensuring there are no obstructions, such as metal chips or debris)
- Press ✱ again and the system will reset to the datum

5.5. Changing the unit of measure

Your MMP can measure in both inches and millimeters. Operators can quickly switch back and forth using the following procedure:

- Hold down  for 3 seconds
- The DRO should change from displaying inches to millimeters or vice versa. Check the lower right-hand corner to see which unit is being displayed

Note – If the unit of measure does not change, check your parameters to ensure that the “F_nn1” parameter is set to “yES”.

5.6. Battery replacement

The battery is located on the rear of the DRO behind a plastic cover. To remove the cover, push in on the ends and pull straight out.

With the cover removed, you can see that the battery is held in by two plastic fingers, one on top and one on the bottom.

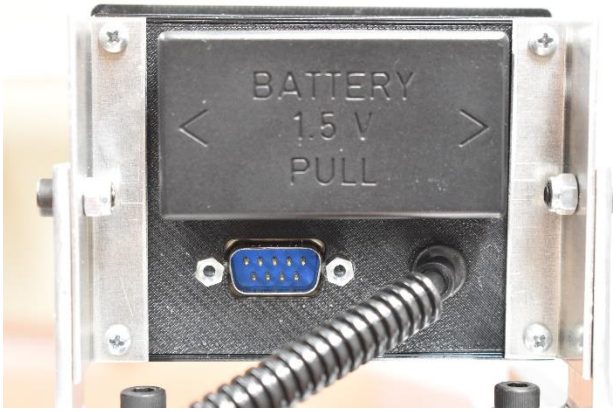
Push one of these fingers away from the battery while removing the positive end, as shown.

Pivot the battery from the negative end until it clears the plastic fingers and can be fully removed.

Note – During battery replacement, you should never use tools to remove the battery or pry against the DRO housing. This can result in the battery compartment pulling loose from the DRO or the solder joints between the battery connectors and the circuit board being pulled loose. For proper battery removal push out on the tabs securing the battery while pulling out on the positive end and it will come free.

Damage caused by improper battery removal will not be covered under warranty

5.7. RS232 port



Your DRO is equipped with an RS232 port below the battery compartment. This port allows you to export data directly from your DRO to your computer via one of two optional SPC accessories. Hymark offers both wireless and wired SPC accessories that enable the SPC output function of the MMP to transmit data to a PC by pressing SET. For more information or to purchase one of these devices please visit our website at kentuckygauge.com.

SPC Cable

Wireless SPC

6. Troubleshooting

Problem	Solution
DRO won't power on	The DRO is constantly under power. If your DRO isn't on the battery may be dead. Replace the battery. (Section 5.6)
DRO won't zero/reference	If you can't get your MMP to zero or reference, most likely the "F_rST" parameter has been changed to "no". Follow the procedure for restoring factory parameters and change "F_rST" to "Yes". If your MMP allows you to reset to zero but doesn't allow you to change the datum to reference the system to a different length, parameter "F_rEF" has been changed to "no". Follow the procedure for restoring factory parameters and change "F_rEF" to "Yes". (Section 5.2)
When zeroing the system DRO resets to a value other than zero	If you are attempting to zero the system and your DRO resets but it resets to a value other than zero, a datum value has been entered in the DRO. To change the datum back to zero, press the SET and ADJ buttons at the same time. Change the displayed value to 0.000. Press the set button to exit. (Section 5.2)
DRO reading erratically or measurements are off varying amounts at various points	Examine the magnetic scale on the rear of the guide rail for signs of damage. If there is no damage, check to see if your sensor is tight and your sensor-to-scale gap is within spec. (Section 4.7)
Measurements are off a set amount the full measuring length	Close the jaws If the MMP is not displaying zero, zero it. Check the parallelism of the jaws. If they aren't parallel adjust them to make them parallel. (Section 4.6)

7. Parameters List

The following chart outlines all the possible options for the various parameters in the DRO. Some of these parameters could make your MMP non-functional. Be sure before experimenting with parameter options, you are familiar with how to return all parameters to the factory settings.

To access parameters, hold down SET for 3 seconds, the DRO should display “SETUP”.

- To access Menu 1: press ADJ
- To access Menu 2: press ✱

*Note – Factory MMP settings are highlighted in Red and **Bolded***

Menu 1	
Parameter	**Description**
Unit	Determines what type of measuring the DRO will perform (linear or angular) as well as, the unit of measure (inches, mm, degrees). DEC – Linear measurement display in decimal FrEE – Display with conversion factor dG1 – Angular display dG2 – Angular display **IdEC** – Inch display mode Ifrct – Fractional inch mode (all separated with decimals, 15 13/64” would display 15.13.64)
COn	Allows operator to set a free conversion factor to display non-metric units, angles, or used as a scaling factor to correct linear inaccuracies. Value range: FrEE = 0.00001-1.00000 dG1, dG2 = 0.00001 – 9.99999 **parameter only available when Unit = FrEE, dG1, or dG2.*

rES	Sets the resolution of the display. Options: Unit (dEC, FrEE, dG1, or dG2) – 0.001, 0.005, 0.01, 0.05, 0.1, 0.5, 1 Unit (IdEC) – 0.0001, 0.0005, **0.001**, 0.005, 0.01, 0.05, 0.1 **parameter only available when Unit = dEC, FrEE, dG1, dG2, or IdEC*
Dir	Sets the counting direction of the sensor. **uP** – up (standard counting direction) dn – down (inverted counting direction)
F_nnI	Enables switching back and forth from inches to millimeters by holding down  . **yES** – enabled (holding  for 3 seconds changes the unit of measure) no – disabled (can only change unit of measure in parameters menu)
F_rEL	Enables the incremental measurement function. yES – Enabled (allows changing the DRO to incremental measuring by pressing  and  simultaneously) **no** – Disabled (DRO stays in absolute measuring)
F_rSt	Turns the referencing/zeroing function on or off. **yES** – Enabled (holding down  for 3 seconds will reference the DRO to the datum value or 0 depending on the setting of F_rEF) no – Disabled (DRO cannot be referenced)
F_rEF	Allows modification of the datum value the DRO references to by pressing  and  simultaneously. **yES** – Enabled (operator can change the datum and the DRO will reference to that value) no – Disabled (DRO will only reference to 0)

F_oFS	Allows adding offset values to the DRO measurements. OFS1 can be adjusted by pressing SET and < simultaneously. OFS2 and OFS3 can be adjusted in the parameter menu only. Operators can select which offsets to apply by pressing ADJ. yES – Enabled (operator can apply offset values to the DRO measurement) **no** – Disabled (operator cannot apply offset values to the DRO measurement) **If F_oFS is previously set to yES and a value is entered for OFS1, the value must be changed to 0 before changing F_oFS to "no" or the offset will continue to be applied.*
rEF	This value is your datum (the value that the DRO resets to when * is held down for 3 seconds). Value can be changed either in parameters menu or by pressing SET and ADJ simultaneously Value range (-999999 to 999999) **this parameter is only available if F_rSt is set to yES.*
OFS1	This is the first offset value, it is added to the measured value. This value can be adjusted by pressing SET and < simultaneously Value range (-999999 to 999999) **this parameter is only available if F_oFS is set to yES*
OFS2	This is the second offset value, it is added to the measured value+OFS1. This value is only adjustable through the parameter menu. Value range (-999999 to 999999) **this parameter is only available if F_oFS is set to yES*
OFS 3	This is the third offset value, it is added to the measured value+OFS1+OFS2. This value is only adjustable through the parameter menu. Value range (-999999 to 999999) **this parameter is only available if F_oFS is set to yES*

Menu 2	
AD xx	Sets device address for serial/network communication to remotely read and write parameter settings. Valid addresses are from 01 to 31. **00** is reserved for broadcast mode. **Please contact your sales representative if serial/network communication is desired.*
H cntr	Hour meter for battery. Displays elapsed time the inserted battery has been used in the DRO. Resolution is 1/10 of an hour (6 minutes).
TIMEr	Sets the inactivity timer for automatically powering off display. After the set time of inactivity has elapsed, the display powers off but the microcontroller remains active to maintain accurate positioning. As soon as the sensor detects movement, the display powers back on. Available timer settings (minutes): **0**, 1, 2, 3, 4, 5, 10, 15, 20, 25, 30.

8. Warranty

Hymark warrants this product for a period of twelve (12) months from the date of shipment. During the warranty period, under authorization from Hymark, return component parts freight prepaid. The company will repair or replace, at its option, any part found to be defective in material or workmanship, without charge to the owner for parts, service labor, or associated shipping costs. This same protection will extend to any subsequent owner during the warranty period. It does not apply to damage caused by accident, misuse, fire, flood, acts of God, or from failure to properly install, operate, or maintain the product in accordance with the printed instructions provided.

This warranty is in lieu of any other warranties, expressed or implied, including merchantability or fitness for a particular purpose, which are expressly included. The owner agrees that Hymark´s liability with respect to this product shall be set forth in this warranty, and incidental or consequential damages are expressly excluded.

Technical Support

Let us know how we can help! Our support technicians look forward to helping you with your Kentucky Gauge equipment.

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