

OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

635190-X

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(REV. C)

DIGITAL METER

FOR USE WITH LUBRICATION FLUIDS



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,
OPERATING OR SERVICING THIS EQUIPMENT.**

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

TECHNICAL DATA

MODELS 635190-1 .. Dispenses in Pints, Totalizes in Gallons
635190-2 .. Dispenses Quarts, Totalizes in Gallons
635190-3 .. Dispenses Liters, Totalizes in Liters

INLET / OUTLET PORTS 1/2" NPT / BSP

MAXIMUM INLET PRESSURE 1,000 PSI (69 bar)

BURST PRESSURE 2,000 (138 bar)

METER MECHANISM Oval Gears

RESOLUTION (Normal) 0,005 Liter / pulses

FLOW RATE (Range) 1/4 to 6-1/2 Gal / min,
(1 to 25 l / min)

STORAGE TEMPERATURE (Range) -20° to 70°C

STORAGE HUMIDITY (Max.) 95% RU

MAXIMUM OPERATING TEMPERATURE 108°F / 42°C

VISCOSITY (Range) 5 to 5000 mPa s

ACCURACY (Typical) ± 1%

REPEATABILITY (Typical) ± 0.3%

LCD DISPLAY

BATCH TOTAL 11.5mm high (0.000 to 999.9) 4 digits, floating point

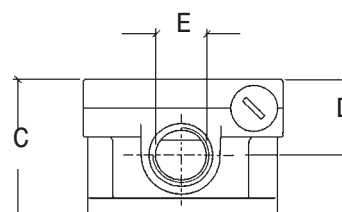
CUMULATIVE TOTAL 5mm high (000000 to 999999) 6 digits, fixed point

POWER SUPPLY Alkaline Batteries (2) 1.5 Volt - N Size
(Ref# Duracell MN9100)

BATTERY LIFE 5000 to 10000 Hrs.

WEIGHT (With batteries) 1Lb (0. 46 Kg.)

REPAIR KITS - (MECHANICAL) 74067-17,
(ELECTRONIC) 74067-18P, -18Q or -18L



DIMENSIONAL DATA

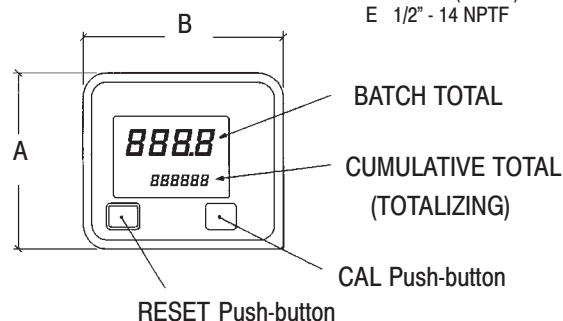
A 2-5/8" (67 mm)

B 3-1/32" (77 mm)

C 2-5/32" (55 mm)

D 1-5/32" (29 mm)

E 1/2" - 14 NPTF



GENERAL INFORMATION

The Electronic Digital Flow Meter is designed to provide precise metering of oils and other lubrication fluids as well as additional liquids compatible with the materials of construction. (Refer to parts list.)

This meter uses oval gears which respond to flow and rotate dividing the fluid into single volumes (units). As the gears rotate they generate a signal via a magnetic coupling which protects the micro-processor from exposure to the fluid. The micro-processor uses a calibration "factor" and calculates pulses generated by the gear rotations into calibrated flow units which display in either Pints, Quarts or Liters on the meter register (BATCH TOTAL).

The meter display panel has two push-buttons:

"RESET" Push-button - On on the left side

"CAL" Push-button - On the right side

NOTE: Calibration is an option not normally used, the factory set calibration "factor" is a unit of measure and is set at the factory under test for each meter and should assure good accuracy for most conditions. Knowledge of the re-calibration feature should not required for normal daily operation.

The CAL push-button function is explained under the ADVANCED INSTRUCTIONS section of this manual (Pages 3 & 4).

The meter mechanism is located in the lower section of the meter and is accessed for cleaning by removing the bottom cover.

BATCH TOTAL is the total liquid dispensed since the last press of the RESET button.

CUMULATIVE TOTAL is the total of all fluid dispensed since the meter power supply was connected the first time (installation). The value displays in either gallons (635190-1, -2) or liters (635190-3). The meter features a non-volatile memory which permanently stores the cumulative total indefinitely in case of a long absence of power.

OPERATION

The readout of the BATCH TOTAL will reset to zero when RESET is pressed.

The readout of CUMULATIVE TOTAL is not affected by any buttons.

INSTALLATION

Flow is not directional and either port can be used for inlet or outlet. The meter can be installed in any position either fixed or incorporated with a control handle. Be certain that threaded connections do not protrude into the measuring chamber which could cause blocking of the gears. It is recommended that a material filter be used at the fluid inlet to protect against possible contamination of the gears by large foreign particles. Note: Use Anaerobic pipe sealant on threads. Do not use Teflon tape.

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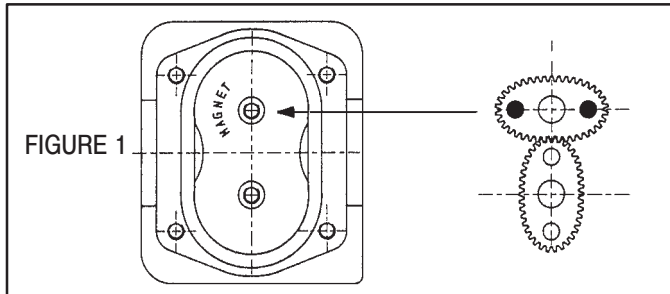
IR Ingersoll Rand
Industrial Technologies

MAINTENANCE

The only maintenance required is occasional cleaning of the measuring chamber and eventual battery replacement.

CLEANING OF THE GEAR CHAMBER

NOTE: Be sure to relieve all fluid pressure from the system and drain out remaining fluid prior to removal of the cover (14) for cleaning. Use a soft brush or small probe to free the gears and be careful not to damage the casing or the gears. Only one of the gears contains the magnets and the location of this gear is indicated. (See Fig 1) The second gear (without magnets) is installed with it's major axis 90° to the first gear. Check for free rotation of the gears prior to replacing the cover.



BATTERY REPLACEMENT

Batteries will need to be replaced when the readout becomes faded or appears blank. Always dispose of the used batteries properly. To replace batteries;

1. Press the RESET button to update the Cumulative total.
2. Unscrew the battery plug (8), remove the batteries (6).
3. Install replacement batteries noting the proper of the direction for battery installation. (Positive "+" end is installed first.)
The readout will read blank even after battery replacement. This is a safeguard to prevent the incorrect powering during replacement.
4. To enter the normal operation mode press the RESET push-button. The meter will indicate the same Cumulative total as indicated prior to power loss and will indicate zeros in the batch total.

TROUBLE SHOOTING

Readout faded.

- Batteries are probably weak and will need replacement.

Readout black.

- Batteries need replacement.
- Press RESET following battery replacement,

Meter does not read accurately.

- The calibration factor is incorrect, refer to the ADVANCED INSTRUCTION section to check the calibration factor.
- The meter is being operated below the minimum required flow rate, increase the flow rate, refer to the TECHNICAL DATA for acceptable flow rate range.

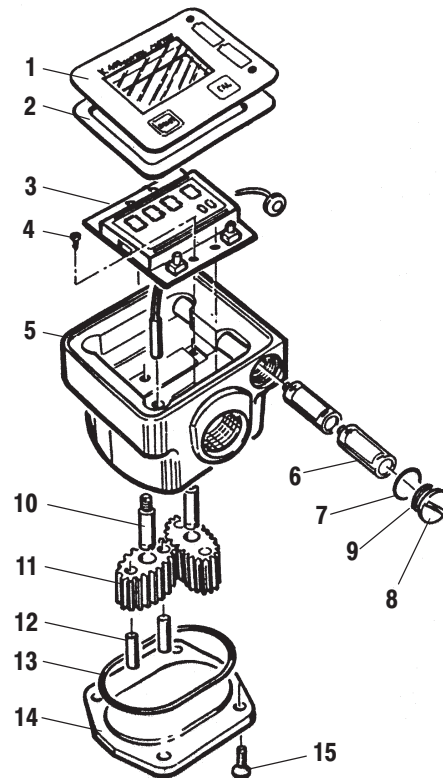
Reduced or Zero flow rate.

- The gears may have become clogged, clean out the measuring chamber.

Meter does not count but flow rate is normal.

- The gears may have been improperly reinstalled following removal, check and reinstall correctly.
- The electronic counter has failed, contact the dealer for service.

FIGURE 2



635190-X ELECTRONIC METER PARTS

ITEM	DESCRIPTION (SIZE IN INCHES)	QTY	PART NO.	[MT]
1	Name Plate	(1)	74067-1	-
2	Self-sticker	(1)	74067-2	-
3	Electronic Board (Pint)	(1)	74067-3P	-
	Electronic Board (Quart)	(1)	74067-3Q	-
	Electronic Board (Liters)	(1)	74067-3L	-
4	Screw (M2 x 13 mm)	(4)	74067-4	[SS]
5	Housing	(1)	74067-5	[A]
6	Battery (1.5 V, N Size)	(2)	74067-6	-
7	"O" Ring (Battery seal)	(1)	74067-7	[B]
8	Battery Plug	(1)	74067-8	[A]
9	Conical Spring	(1)	74067-9	[C]
10	Shaft	(2)	74067-10	[SS]
11	Oval Gear	(2)	74067-11	[PS]
12	Magnet	(2)	74067-12	-
13	"O" Ring (Cover seal)	(1)	74067-13	[B]
14	Cover	(1)	74067-14	[A]
15	Screw (M5 x 16 mm)	(4)	74067-15	[SS]
16	Battery Sleeve (not shown)	(1)	74067-16	[PS]

REPAIR KITS AVAILABLE

ELECTRONIC KIT 74067-18P, -18Q, -18L; INCLUDES ITEMS: 1, 2, 3
MECHANICAL KIT 74067-17; INCLUDES ITEMS: 11(2), 12(2), 13

MATERIAL CODE

[A] = Aluminum [PS] = Polyester
[B] = Nitrile [SS] = Stainless Steel
[C] = Carbon Steel

MEASUREMENT UNITS CONFIGURATION FOR 635190-X DIGITAL METER

Some models are provided with a menu through which the user can select the main measurement unit, Quarts (**Qts**), Pints (**Pts**), Litres (**Lit**), Gallons (**Gal**);

The combination of the unit of measurement of the Partial register and that of the Totals is predefined according to the following table:

Combination no.	Unit of Measurement Partial Register	Unit of Measurement Totals Register
1	Litres (L)	Litres (L)
2	Gallons (Gal)	Gal Gallons (Gal)
3	Quarts (Qts)	Gal Gallons Gal
4	Pints (Pts)	Gal Gallons Gal

To choose between the 4 available combinations:

Wait for the METER to go to Standby

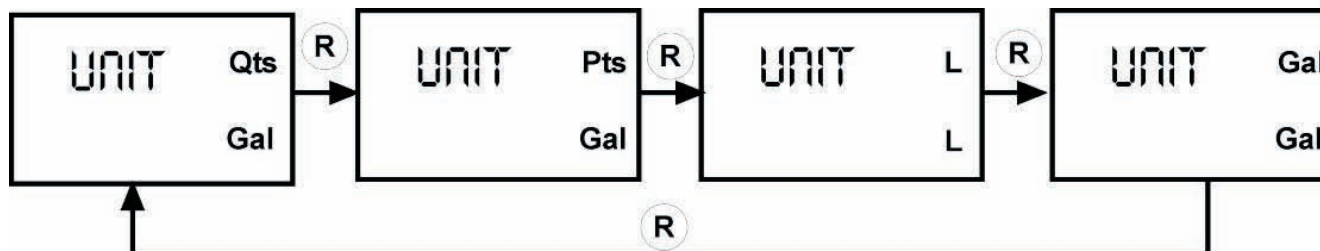


Then press the CAL and RESET keys together. Keep these pressed until the word "UNIT" appears on the screen together with the unit of measurement set at that time

(in this example Litres / Litres)



Every short press of the RESET key, the various combinations of the units of measurements are scrolled as shown below:



By pressing the CAL key at length, the new settings will be stored, the METER will pass through the start cycle and will then be ready to dispense in the set units.

IMPORTANT

The Reset Total and Total registers will be automatically changed to the new unit of measurement.

NO new calibration is required after changing the Unit of Measurement.

ADVANCED INSTRUCTIONS FOR 635190-X DIGITAL METER

METER CALIBRATION INSTRUCTIONS

THESE ADVANCED INSTRUCTIONS DESCRIBE THE PROCEDURES TO CALIBRATE THE METER.

NOTICE: THE METER WAS CALIBRATED AT THE FACTORY.

For most applications this should be adequate. Recalibration is not normally required and should only be performed by a technically competent person. Read and understand all instructions before proceeding.

A

OPERATION MODES

The 635190-X digital meter has two operating modes.

NORMAL MODE

When in this mode the meter allows the measuring of the fluid dispensed.

The RESET push-button will clear the BATCH TOTAL before each dispensing cycle and the LCD displays only the BATCH TOTAL and CUMULATIVE TOTAL.

CALIBRATION MODE

When in this mode the user can calibrate the meter or check the actual calibration. The LCD displays "CAL" regardless of the indication of BATCH TOTAL and CUMULATIVE TOTAL which will depend on the phase of the calibration procedure. In calibration mode the meter cannot be used for normal metering.

NOTICE: Exit from calibration mode is not automatic. Do not to leave the meter in calibration mode during storage since in this mode the battery consumption is considerably higher.

B

CALIBRATION FACTOR

To allow precise measuring the meter micro-processor will apply a calibration factor to the pulses received from the meter mechanism and transforms these pulses into engineering units which are displayed on the LCD.

This meter is provided with two calibration factors, known as "K" factors.

- 1) FACTORY K FACTOR,
- 2) USER K FACTOR.

FACTORY "K" FACTOR

This has been set at the factory and is not changeable by the user.

NOTICE: The value of the Factory K factor depends on the engineering units displayed on the BATCH TOTAL and will then be different versions of the meter.

The Factory K factor is set as follows:

635190-1	A figure near .	10,570 . . .	For PINT version
635190-2	A figure near .	5,286 . . .	For QUART version
635190-3	A figure near .	5,002 . . .	For LITER version

The exact value of the Factory K factor used by your meter could be slightly different from these values, it has been defined by factory tests.

USER K FACTOR

This is changeable by the user.

As shipped from the factory this value is set the same as the Factory K factor.

After calibration the User K factor could assume any value even if it differs from the factory value however a value which is far from the Factory K value is probably incorrect and calibration was not performed correctly.

The user can switch from the Factory K factor to the User K factor or vice versa as required. (Section E)

C

CALIBRATION PROCEDURE

To calibrate the meter refers to the modification of the User K factor in order to reach better accuracy in the event the Factory K factor is not satisfactory.

To modify the User K factor two different procedures are available:

FIELD CALIBRATION BY DISPENSING

DIRECT CORRECTION OF THE USER K FACTOR

FIELD CALIBRATION BY DISPENSING - Refer to section F

This procedure is used to calibrate the meter in specific conditions of operation by dispensing fluid.

DIRECT CORRECTION OF THE USER K FACTOR - Refer to section G

This calibration procedure is particularly useful to correct an inaccuracy shown over several dispensing cycles.

If the normal use of the meter shows an average inaccuracy this could be corrected by applying an average percentage correction to the User K factor. In this case the percentage correction has to be calculated by the user and then applied to the User K factor.

Example:	Average Inaccuracy	- 0.9%
	User K factor in use	5002
	New User K factor	$5002 \times (1 + 0.9 / 100) = 5047$

NOTE: If the meter indicates less than the real value (negative error) the User K factor must be increased and vice versa.

The meter is equipped with a non volatile memory which permanently stores the calibration K factors and the cumulative total for an indefinite time in case of a sustained loss of power.

Following battery replacement there is no need to recalibrate, before starting operation simply select the User K factor to continue.

PUSH-BUTTON OPERATION / DISPLAY INDICATIONS

These button actions are used in calibration when required.

- SHORT press - press and release the button.
- LONG press - press and hold for at least 3 seconds before release.

DISPLAY CONDITION AFTER ACTION

Showing figure in which the CUMULATIVE TOTAL and the BATCH TOTAL have the following indications and meaning.

BATCH TOTAL - in NORMAL mode or CALIBRATION mode

0.000	after reset
5.555	displays a GENERIC FIGURE

CUMULATIVE TOTAL - in NORMAL mode

55555	displays a GENERIC FIGURE of the total in Gallons or Liters dispensed since installation.
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CUMULATIVE TOTAL - in CALIBRATION mode

F 55555	displays the FACTORY CALIBRATION FACTOR (GENERIC FIGURE 5 or 4 digit)
U 55555	displays the USER CALIBRATION FACTOR (GENERIC FIGURE 5 or 4 digit)

D

FIELD CALIBRATION BY FLUID DISPENSING

To assure best calibration consider the following before proceeding.

- Purge the system of any air by dispensing until the stream is full and steady, stop the flow with the system active.
- Use a known measuring container of not less than 5 liters with graduations.
- During calibration, dispense the fluid at the same rate as used in normal dispensing.
- Do not "choke" or "trickle" the flow to reach the exact volume, the correct technique is to start and stop the full flow as many times as is necessary to reach the graduated zone of the calibration container.
- Follow the proper button sequence during the calibration procedure.

E**CHECK / CHANGE THE K FACTOR**

To check which factor is currently in use or to change from one to the other.

ACTION #, Activity	DISPLAY
# 1, NONE Meter in <u>NORMAL</u> mode.	5.555 555555
# 2, LONG press of CAL Meter enters into the <u>CALIBRATION MODE</u> , displays the Calibration factor in use in the CUMULATIVE TOTAL. Letter F=Factory, U=User on the left of the factor indicates which factor is currently in use.	F 5002
# 3, SHORT press of RESET Meter switches from one factor to the other. The action can be repeated to return to the previous factor.	CAL U 4988
# 4, SHORT press of CAL Meter goes back into <u>NORMAL</u> mode, ready to work using the last factor shown.	0.000 555555

F**FLUID CALIBRATION BY DISPENSING**

ACTION #, Activity	DISPLAY
# 1, NONE Meter in <u>NORMAL</u> mode.	5.555 555555
# 2, LONG press of CAL Meter enters into <u>CALIBRATION MODE</u> showing the CAL indication and the K factor in use.	CAL F 5002
# 3, LONG press of RESET Meter displays the CAL indication and the BATCH TOTAL set at zero. Meter is now ready to perform field calibration by dispensing or the direct correction of User K factor. (Sec. G)	0.000 CAL
# 4, (dispensing into calibration container) Without pressing any buttons, start the dispensing into the container. The calibration dispensing can be stopped and restarted as needed. Start and stop in a sudden way until the container is correctly filled. The calibration procedure does not require the reaching a fixed quantity of fluid dispensed.	10.06 CAL
# 5, LONG press of RESET Meter is informed that calibration dispensing is over. <u>Be careful that calibration dispensing is correctly finished before this action.</u> To calibrate the meter the value indicated by the BATCH TOTAL (10.06 in the example) has to be forced equal to the <u>REAL VALUE</u> indicated by the container. (9.89 in the example). On the bottom / left of the display an arrow (up or down) appears as soon as the action #5 is performed, showing the direction (increase or decrease) in which the indicated value moves if action #6 is performed.	10.06 ▲ CAL
# 6, SHORT press of RESET Arrow changes direction. The action can be repeated as many times as needed.	10.06 ▼ CAL
# 7, SHORT / LONG press of CAL Value indicated changes in the direction fixed by the arrow, -one unit (of the right most digit) with each SHORT press of CAL	9.980 ▼ CAL

-if CAL is pressed and held (at a slow rate for the first 5 units, then at quicker rate) if the desired value is passed over, repeat action #6 to go back.

8, LONG press of RESET

Meter is informed that the calibration procedure is over. Be certain that the indicated value is equal to the real value before performing this action. The meter now computes a new User K factor, this could take a few seconds, depending on the correction performed. During this stage the arrow disappears but the CAL indication stays on. If this action is performed after action #5 without changing the indicated value, the User K factor becomes equal to the Factory K factor.

9.980
CAL

9, NONE

At the end of the computing the new User K factor (4960 in the example) is shown for few seconds, then automatically disappears.

0000
CAL
U 4960

10, NONE

Meter stores the new User K factor and is ready to work using the new User K factor.

0.000
555555

G**DIRECT CORRECTION OF USER K FACTOR**

To amend the User K factor without dispensing fluid.

ACTION #, Activity	DISPLAY
# 1, NONE Meter in <u>NORMAL</u> mode.	5.555 555555
# 2, LONG press of CAL Meter enters into the <u>CALIBRATION MODE</u> showing the CAL indication and the K factor in use.	CAL F 5002
# 3, LONG press of RESET Meter displays the CAL indication and the BATCH TOTAL set at zero. Meter is now ready to perform the direct correction of User K factor or the field calibration by dispensing. (Sec.F)	0.000 CAL
# 4, LONG press of RESET The direct User K factor amend is chosen. The BATCH TOTAL disappears and the actual value of the User K factor is shown on the CUMULATIVE TOTAL. On the left of the factor an arrow (up or down) indicates the direction (increase or decrease) in which the value moves if the #7 is performed.	▲ CAL U 5002
# 5, SHORT press of RESET Arrow changes direction. Action #5 can be repeated as many times as needed.	▼ CAL U 5002
# 6, SHORT / LONG press of CAL Value of User K factor changes in the direction fixed by the arrow, -one unit (of the right most digit) with each SHORT press of CAL -if CAL is pressed and held (at a slow rate for the first 5 units, then at quicker rate), if the desired value is passed over, repeat action #5 to go back.	▲ CAL U 5047
# 7, LONG press of RESET <u>Be careful to have reached the desired figure for the new User K factor before this action.</u> The meter stores the new User K factor and is ready for work using it.	0.000 555555
