WATER SPECIALTIES™
PROPELLER METER

DIGITAL INDICATOR - TOTALIZER TRANSMITTER

MODEL TR29-2

OPERATION AND MAINTENANCE MANUAL
PARTS LIST

FEATURING:
*MODEL CN08-2 DIGITAL INDICATOR-TOTALIZER
*ENCAPSULATED ELECTRONICS
*SOLID STATE CONSTRUCTION
*CURRENT OUTPUT SIGNAL
*PULSE OUTPUT SIGNAL
*SEALED HOUSING

McCROMETER

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WARRANTY

This Warranty shall apply to and be limited to the original purchaser consumer of any McCrometer product. Meters or instruments defective because of faulty material or workmanship will be repaired or replaced, at the option of McCrometer, free of charge, FOB the factory in Hemet, California, within a period of one (1) year from the date of delivery.

Repairs or modifications by others than McCrometer or their authorized representatives shall render this Warranty null and void in the event that factory examination reveals that such repair or modification was detrimental to the meter or instrument. Any deviations from the factory calibration require notification in writing to McCrometer of such recalibrations or this Warranty shall be voided.

In case of a claim under this Warranty, the claimant is instructed to contact McCrometer, 3255 W. Stetson Ave., Hemet, California 92545, and to provide an identification or description of the meter or instrument, the date of delivery, and the nature of the problem.

The Warranty provided above is the only Warranty made by McCrometer with respect to its products or any parts thereof and is made expressly in lieu of any other warranties, by course of dealing, usages of trade or otherwise, expressed or implied, including but not limited to any implied warranties of fitness for any particular purpose or of merchantability under the uniform commercial code. It is agreed this Warranty is in lieu of and buyer hereby waives all other warranties, guarantees or liabilities arising by law or otherwise. Seller shall not incur any other obligations or liabilities or be liable to buyer, or any customer of buyer for any anticipated or lost profits, incidental or consequential damages, or any other losses or expenses incurred by reason of the purchase, installation, repair, use or misuse by buyer or third parties of its products (including any parts repaired or replaced); and seller does not authorize any person to assume for seller any other liability in connection with the products or parts thereof. This Warranty cannot be extended, altered or varied except by a written instrument signed by seller and buyer.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

McCrometer reserves the right to make improvements and repairs on product components which are beyond the Warranty period at the manufacturer's option and expense, without obligation to renew the expired Warranty on the components or on the entire unit. Due to the rapid advancement of meter design technology, McCrometer reserves the right to make improvements in design and material without prior notice to the trade.

All sales and all agreements in relation to sales shall be deemed made at the manufacturer's place of business in Hemet, California and any dispute arising from any sale or agreement shall be interpreted under the laws of the State of California.

MODEL TR29-2
DIGITAL INDICATOR-TOTALIZER-TRANSMITTER
INDEX

I. DESCRIPTION:

The Model TR29-2 Digital Indicator Totalizer Transmitter provides flow rate indication, totalization, of flow volume and a current output signal proportional to the rate of flow when mounted on our meters. The TR29-2 is for installation on propeller meters.

II. SPECIFICATIONS:

ACCURACY Rate: ±0.25% of reading.

TEMPERATURE RANGE Operation: 32° to 160° F.
Storage: -40° to 160° F.
Consult factory for special construction for other temperatures.

INPUT SIGNAL

Type:	Voltage pulse.
Voltage Range:	1 to 10V.
Minimum Frequency:	0.125Hz.
Maximum Frequency:	3KHz.
Minimum Pulse Width:	2µs.

OUTPUT SIGNAL Scaled Pulse Output:
Open collector MOS transistor.

Pulse width:	32 milliseconds.
Maximum Rating:	1 to 32 V.

EMI/EMC

Electrostatic Discharge: (IEC 1000-4-2 Level 3).	8KV
Electrical Fast Transient (IEC 1000-4-4 Level 3).	1KV

RF Susceptibility:
150 KHz to 230 MHz @ 10V
(IEC 1000-4-4 Level 3).

POWER SUPPLY Battery Type - 3 VDC Lithium, Replaceable.
Operating Life - 4 years (when used with the display timeout into sleep mode feature).
Low Battery Indication - 6 months before expiration.

OPTIONAL EQUIPMENT Mounting brackets, with up to 100 feet of cable for remote installation.

SHIPPING WEIGHT 4 pounds.

ORDERING INFO Must be specified by the customer and includes: serial number of meter unit is to be mounted on, maximum scale range required for 4-20 output, indicator scale and units, totalizer dial units. Consult factory for special applications.

III. UNPACKING. When unpacking the transmitter, any damage due to rough or improper handling should be reported to the transportation firm and McCrometer. If for any reason it is determined that the unit or parts of the unit should be returned to the factory, please contact McCrometer for clearance prior to shipment. Each unit must be properly packaged to prevent any further damage. The factory assumes no responsibility for equipment damaged in return shipment due to improper packaging. Proper paperwork must be enclosed with any returned material.

The shipping carton contains the following items:

Model TR29-2	1
Mounting Base O-ring	1
Mounting Base (w/hardware)	1
Operation and Maintenance Manual	1

IV. INSTALLATION of transmitters is normally done at the factory when the meter is assembled, but may be made in the field. Depending upon what situation exists, various steps for installation apply and the procedures are outlined below.

V. METERS with mechanical drive totalizers or indicator-totalizers require a conversion kit. This kit consists of all necessary parts to convert a mechanical drive meter into an electronic meter. Follow the instructions included with the conversion kit for your meter. Once conversion is complete, follow the procedures outlined below for installation of Model TR29-2 on an electronic meter.

1. REMOVE the existing digital indicator by removing the four mounting screws. Lift the unit slightly, turn it over, and disconnect the two lead sensor from the bottom of the indicator.

2. CLEAN METER HEAD of all dirt, glue, gaskets, and other foreign material.

3. TRANSMITTER MOUNTING BASE (#10) and O-ring (#12) must be installed on the meter head. Position the mounting base (#10) so the watertight connector (#14) and transmitter output cable (#13) is on right side of meter when looking upstream. Apply a small amount of silicone grease to the O-ring (#12). Secure base to meter with four mounting screws (#11). Connect the sensor wires from the meter to the bottom of the TR29-2. Be sure terminals are secure. The sensor wires should pass through the hole in the base cup (#8). (See wiring diagrams on page 10 or 11.)

4. POSITION OF INDICATOR-TOTALIZER TRANSMITTER on top of the mounting base can be made in one of four directions for the easiest possible reading. Normally the units are attached such that they can be read when looking upstream. Prior to mounting the transmitter on the mounting base, the wiring connections must be made to the transmitter. Connect the wire from the transmitter output cable (#13) to the pulse output terminal on the bottom of the unit. The output is polarized. Be sure terminal is secure. DO NOT TOUCH ANY OF THE OTHER TERMINALS ON THE BOTTOM OF THE TRANSMITTER. Apply a small amount of silicone grease to the base cup O-ring (#2) and secure transmitter bonnet with four mounting screws (#3).

5. TRANSMITTER WIRING can be accomplished by following the wiring diagram on page 8, 10 or 11.

TRANSMITTER
OPERATION AND MAINTENANCE MANUAL

VI. MCCROMETER products have been carefully designed to be as maintenance free as possible. Periodic preventive maintenance, however, is highly recommended and should be practiced according to schedule to assure continuous accuracy and trouble-free performance of your meter. The maintenance and inspection procedure can also be used as a guide to locating a problem in the transmitter that may be the cause of abnormal operation.

NOTE: METER DISPLAY WILL SHUT OFF AFTER A FEW MINUTES WITH THE LID OPEN. TO READ METER, CLOSE LID AND OPEN IT AGAIN.

VII. SENSOR AND TR29-2 DIGITAL INDICATOR-TOTALIZER-TRANSMITTER

1. TR29-2 DIGITAL TRANSMITTER (#4) should not be removed from the meter unless battery or sensor replacement is required or if the unit is to be reprogrammed. If the unit must be removed, proceed as follows:

2. TR29-2 (#4) can be removed from the transmitter mounting base (#10) by removing the four bonnet mounting screws (#3).

REPROGRAMMING: The bonnet can be lifted enough to slide the base cup and digital transmitter out of the bonnet allowing access to the programming buttons. (See Programming Guide literature #30110-17.)

3. SENSOR ASSEMBLY in the meter can be replaced by following the meter instruction manual.

4. 3-VOLT LITHIUM BATTERY (#6) should offer an average of 4 years of operation. The register has a low battery display that comes on when approximately six months of life is remaining. It may be to your advantage to test the battery now so it can be replaced if necessary. The battery should test between 2.5 and 3 volts to be considered good.

If battery replacement is necessary, proceed as follows:

a) Remove bonnet base cup (#8) from bonnet by prying up with a small screw driver in the two slots in bottom of bonnet (#1) and lifting out the TR29-2 assembly (#4).

b) Carefully disconnect sensor and transmitter wires.

c) Remove the batteries from the holders. Replace batteries with positive (+) and negative (-) positioned as noted on circuit card.

d) Reconnect the sensor and transmitter wires.

e) Reinsert TR29-2 assembly (#4) into bonnet assembly (#1) with **top of dial aligned with hinge side of bonnet**.

f) Install bonnet O-ring (#2) in bonnet with coating of silicone grease.

NOTE: Batteries should be disposed of in an environmentally safe manner.

IX. TROUBLESHOOTING the transmitter is necessary if it is apparent that the instrument being controlled by the transmitter is not receiving a proper signal from the transmitter, and/or the totalizer or indicator-totalizer is not functioning. Before beginning, it is important to be sure that the problem is with the transmitter.
The following checks should be made:
1) Check to be sure that water is flowing through the meter at flows above the minimum flow rate for the given size meter.
2) Check the instrument to be sure it has the required power being supplied to it.
3) Check the junction box to be sure the communication lines from the transmitter to the instrument are making good contact and that the transmitter is wired properly to the instrument (see wiring diagrams on page 8, 10 or 11).

1. THE TROUBLESHOOTING GUIDE is provided to help isolate any problem that may occur with the transmitter. Follow the instructions and test procedures listed for each problem.

NOTE: The meter assembly should be inspected thoroughly to be sure it is operating properly and is not the cause of the problem (refer to your meter service manual for instruction on inspection of the meter).

If the meter indicator-totalizer and remote instrument **do not** operate, check the TR29-2 by opening and closing the lid twice. If no response, then follow all procedures.

2. WORKING AREA chosen for testing and inspection of the internal components should be clean to reduce the chance of dust or dirt particles being introduced into the transmitter mechanism.

3. TR29-2 DIGITAL TRANSMITTER must be removed from the mounting base (#10) to gain access to the transmitter terminals and to check connections. Remove the unit from the mounting base following instructions in section VIII. Check the connection from the sensor in the meter to the terminals in the bottom of the TR29-2. Check the connection from the pulse and mA terminals on the TR29-2 to the instrument. Make sure the connection is clean, tight, and the terminal is secure.

4. MOISTURE should not be apparent within the transmitter bonnet (#1). All O-rings should be inspected for breaks or presence of foreign materials that allow leakage to occur. Check to be sure water is not coming up through the meter head. If water is coming up through the meter head then the meter should be checked (see meter service manual).

X. INSPECTION and field testing has been accomplished at this point. Should any of the parts, upon inspection, appear to be damaged, they must be replaced to assure proper operation and prevent further damage.

XI. REASSEMBLY is necessary at this point. Before reassembling, make certain that the unit is cleaned of any dust or dirt. Cost for replacement parts not covered by warranty are available by contacting the factory.

BEFORE RETURNING TRANSMITTER TO FACTORY please notify McCrometer. Each unit must be properly packaged to prevent damage to the product during shipment. Should any of the unit's parts, upon inspection, appear to be damaged, they must be replaced to assure proper operation and prevent further damage. Cost for replacement parts not covered by warranty are available from current parts and price list. Should the unit require further inspection, it must be reassembled and returned to the factory.

XII. PROCEDURES FOR CHECKING OUT INOPERATIVE INSTRUMENT SYSTEMS:

All instruments are factory tested with the transmitter that will be operating it. When an instrument doesn't operate and it is connected to its proper transmitter, certain procedures need to be followed to determine where and what the problem is. Most troubleshooting procedures are part of each instrument and transmitter service manual, but these suggestions may help.

1. CHECK ALL INSTRUMENTS AND TRANSMITTERS for obvious visual damage. Make certain any necessary grounding has been made.

2. CHECK YOUR INSTRUMENT to be sure it is operating properly by following the instrument service manual. Check to be sure your instrument is operating correctly when a simulated signal is put into it.
WARNING: Circuit to transmitter must be disconnected when most testing equipment is used for checking your instrument. If instrument checks out, proceed with checking transmitter and communication lines.

5. TRANSMITTER COMMUNICATION LINES (#13) should be checked to determine if the pulse output is present.
WARNING: A.C. power should be disconnected to the instrument prior to any work taking place on the wiring.

A. The preferred method of checking the pulse output is to use a McCrometer Model IN16 attached to the pulse output of the TR29-2. The McCrometer IN16 will count each time the transmitter sends a pulse.

B. A voltmeter can also be used to check the pulse output. Using a voltmeter, on 0 to 5 VDC scale, measure voltage between the two pulse output wires when the totalizer count changes. It will display a pulse voltage every time the totalizer counts (the voltage displayed will depend on how quickly your meter responds).

If the pulse is present at the instrument, then the problem is with the instrument. If the pulse is not present, perform the same tests at the junction box and at the transmitter itself. If the pulse is present at the junction box, then the problem is with the communication lines from the junction box to the instrument. If the pulse is present at the transmitter, there is something wrong in the communication lines between the transmitter and the instrument. If no pulse can be measured the unit must be returned to the factory (see section XI, 1).

6. COMMUNICATION PROBLEMS can be so complex it is usually recommended the instrument contractor or electrical contractor be informed that our transmitters and indicators prove to be good units and the trouble could be elsewhere. Sometimes it is necessary to lay another line from the transmitter to instrument above ground to help prove the lines are at fault prior to pulling and replacing existing line. Communications lines should be kept from tangling up in high voltage lines inside the panel or wiring cabinet. Communication lines should be shielded cable and not run in same conduit as power lines. Sometimes the 115 V A.C. line used for the instrument can be causing the trouble. It is suggested the plug from the instrument be temporarily transferred to another A.C. outlet which is on another circuit. It has been found a fluorescent light circuit tied in with the instrument power source, or faulty parking lot vapor lights can effect the instruments if A.C. wiring is done incorrectly giving a noisy A.C. circuit. Make certain the ground is connected to earth ground.

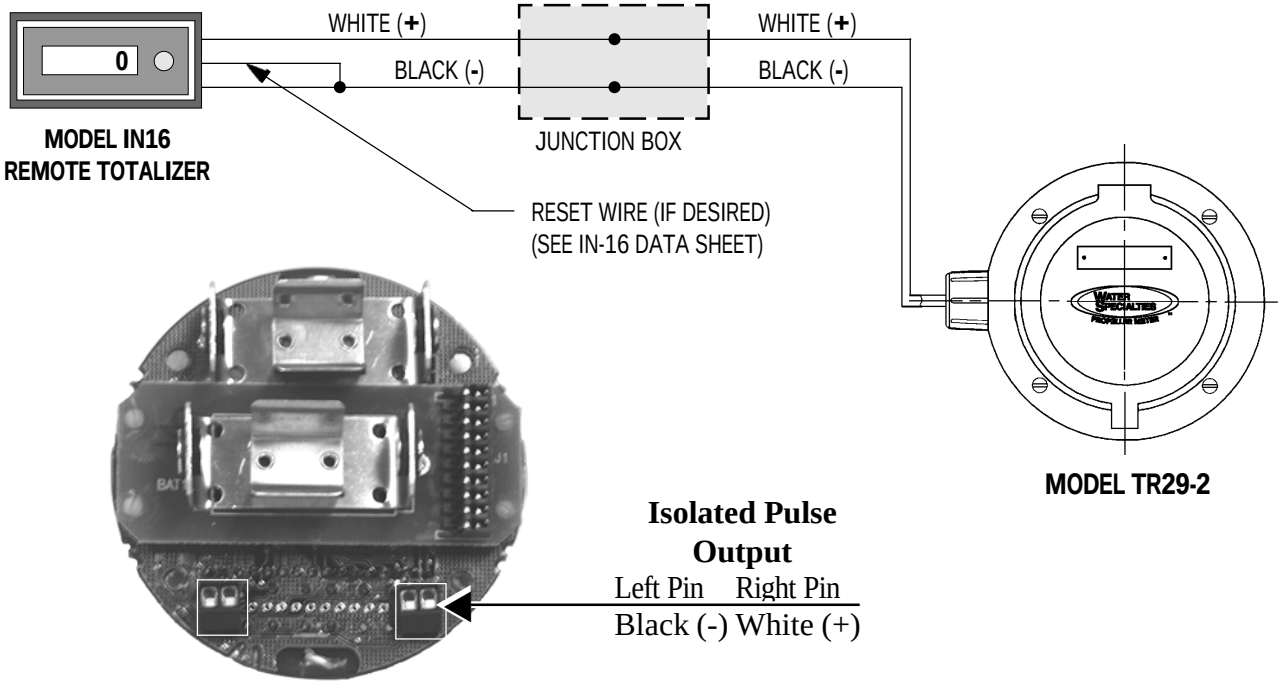
7. SEPARATION OF SIGNAL AND POWER wiring in separate conduits is the traditional precaution, however, other measures must be taken to minimize the effects of electromagnetic interference (EMI) and radio frequency interference (RFI) on the operation of the instrument. Otherwise, if high level, short duration noise spikes are permitted to enter the digital equipment, the noise can be transferred into the systems logic networks and can be misinterpreted as signal data, resulting in erroneous system operation and other unpredictable responses. Potential noise sources:

- Relay coils
- Solenoids
- AC power wires
- Current carrying cables
- Radio frequency transmissions

NOTES

NOTES

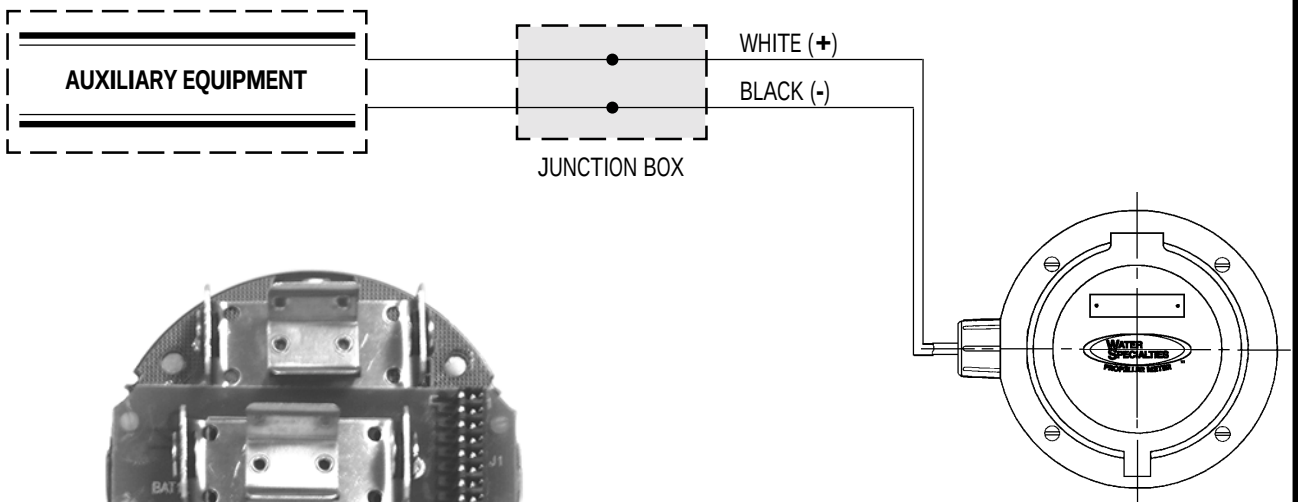
PULSE OUTPUT WIRING WHEN USED WITH MODEL IN16



Isolated Pulse Output

Left Pin	Right Pin
Black (-)	White (+)

PULSE OUTPUT WIRING WHEN USED WITH AUXILIARY EQUIPMENT



Isolated Pulse Output

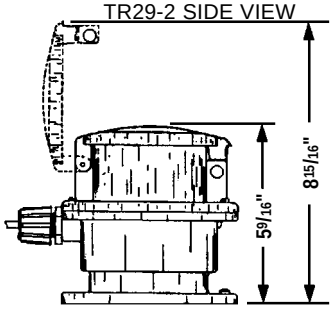
Left Pin	Right Pin
Black (-)	White (+)

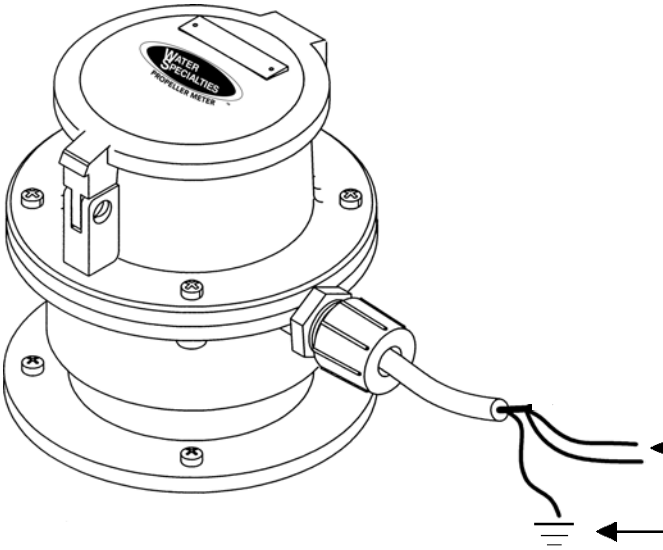
MODEL TR29-2

INDICATOR - TOTALIZER - TRANSMITTER

● SOLID STATE CONSTRUCTION ● PULSE OUTPUT SIGNAL
● ONE PULSE PER TOTALIZER COUNT ● DIGITAL DISPLAYS

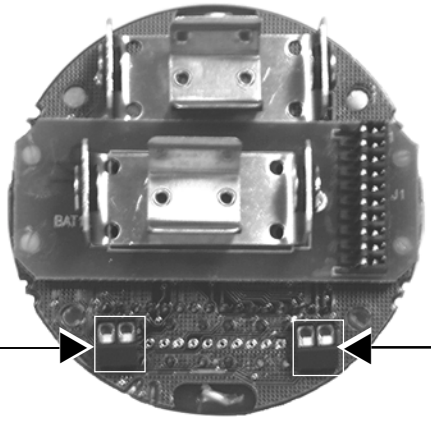
TR29-2 SIDE VIEW





BLACK (-) AND WHITE (+)
FOR PULSE OUTPUT
(ONE CONTACT PER
TOTALIZER COUNT)

SHIELD TO PLAIN EARTH
GROUND AT PANEL END



Sensor Wiring Input

Left Pin	Right Pin
Red (+)	Black (-)

Isolated Pulse Output

Left Pin	Right Pin
Black (-)	White (+)

DIGITAL INDICATOR - TOTALIZER - TRANSMITTER
MODEL TR29-2
PARTS LIST

No.	QTY	Part Number	Description
1	1	5-4316-D-2	Digital Indicator-Totalizer Bonnet Assembly
2	1	1-1551-38	O-ring, Digital Indicator-Totalizer Bonnet
3	4	1-1115-10-10B	Screw, Bonnet Mounting (each)
4	1	5-TR29-2	Digital Indicator-Totalizer Assembly (Items 5 to 9)
5	1	1-1910-28-2	Digital Indicator Totalizer
6	4	1-1783-8	Battery (each)
8	1	1-4318-5	Base Cup
9	1	1-1551-17	O-ring, Base Cup
10	1	4-4141-2	Base Assembly
11	4	1-1115-10-10B	Screw, Bonnet Mounting (each)
12	1	1-1551-38	O-ring, Mounting Base
13	1	3-1701-4	Cable Assembly, 4 lead
14	1	1-1711-5	Water Tight Connector

When ordering replacement parts, please specify: • **Meter Size** • **Meter Model** • **Meter Serial Number**

Contact Factory For Prices.

DIGITAL INDICATOR - TOTALIZER - TRANSMITTER
MODEL TR29-2
FOR ELECTRONIC PROPELLER METERS