



**4292**  
**Digital Hydraulic Readout**  
**User Manual**



## Introduction

The OTC 4292 Digital Hydraulic Readout, when connected to the OTC 4291 flow block, accurately measures flow, pressure and temperature.

This easy to use diagnostic unit can pinpoint hydraulic system faults, reduce downtime and help in preventative maintenance.

The readout has two flow inputs and can be connected to one flow block by a 20 ft. long cable and micro-bore hose assembly to the left hand side of the readout. A second flow block can be connected via a 6-1/2 ft. long cable to the front of the readout. Flow inputs can be easily calibrated by the operator. The readout is scaled in lpm, gpm, US gpm, selectable by push button.

## Safety Precautions



**CAUTION:** To prevent injury and / or property damage,



- Study, understand, and follow all safety precautions and operating instructions before using this equipment. If the operator cannot read instructions, operating instructions and safety precautions must be read and discussed in the operator's native language.

- No alteration shall be made to this product.

- Inspect the condition of the equipment before each use; do not use if damaged, altered, or in poor condition.

- Ensure load valve is fully open prior to testing.



- Wear eye protection that meets the standards of ANSI Z87.1 and OSHA.

## Basic operation

### Temperature

The thermistor-type temperature transducer mounted within the flow meter is in contact with the oil flow, and temperature is displayed on the left-hand side of the digital display. Temperature from the remote flow meter plugged into the side of the unit is displayed in the INT and TACH position; temperature from a remote flow meter plugged into the EXT socket on the front is displayed in the EXT position. Pressing the °C/°F button toggles the display between Centigrade and Fahrenheit; the unit selected is indicated by a cursor arrow.

### Flow Block - OTC 4291 and/or OTC 4290

The flow comprises an axial turbine mounted in an aluminum block. The oil flow rotates the turbine and its speed is proportional to the oil velocity. The revolutions of the turbine are measured by means of a magnetic sensing head which feeds a pulse every time a turbine blade goes by, to an electric circuit. The circuit amplifies the pulse, shapes it into square wave form and has a digital output which is directly proportional to the number of pulses per second. Flow rate is displayed in the right-hand side of the digital display when INT or EXT are selected. Pressing the **units** button switches the display to lpm, IMP gpm or US gpm and the selection is indicated by a cursor arrow. When the flow rate falls below the minimum allowable, "L" is indicated on the display. When flow rate exceeds the maximum, "H" is indicated on the display.

### Loading Valve - OTC 4291 only

All loading valves work on the same theory - a poppet is moved in and out of a flow port via a threaded shaft. The unique design of the pressure-balanced poppet ensures low handle effort throughout the flow and pressure ranges in addition to excellent tactile feedback, regardless of flow direction. In the event of overpressure, replaceable burst discs (situated within the poppet) rupture, to internally bypass the oil at low pressure.

### Pressure Gauge

The pressure gauge has a spiral Bourdon tube and the gauge case is filled with glycerine to ensure good dampening on pulsating pressures. The gauge is connected to the flow meter via a micro-bore hose.

### Fast Button

The **fast** button changes the update time of the display. In some situations quick response to flowrate changes is required. With the cursor arrow highlighting the **fast** position, the update time is approximately 1/3 second. Otherwise the update time is approximately 1 second. When using the fast update, the display will be less stable on flow and shaft speed.

### ON Button

The unit is designed to turn off automatically after approximately 15 minutes to conserve power. When this occurs, user-programmed values are retained in the memory. The unit is restarted by pressing the ON button.

## Installation guidance

1. Although the unit is bi-directional, which means it can be used in both flow directions, the preferred direction is indicated on the block. When the flow meter is used for reverse flow tests, slightly lower accuracies may be obtained depending on the oil viscosity, density and compressibility.
2. The unit can be connected to the hydraulic circuit by means of flexible hoses or rigid pipes, 8" (200 mm). The use of quick-disconnect couplings can save time. The hoses and fittings at the inlet to the unit must be of adequate size for the flow being tested. Elbows, rotary couplings etc., at the inlet and outlet ports should be avoided to ensure accurate readings.
3. Connect the cable and micro-bore hose assembly at the readout; then connect to the unit. **IMPORTANT**, after testing, disconnect at the unit first to avoid oil spillage.
4. After installing it is important to ensure that all connections are tightened and the oil can flow freely throughout the hydraulic system **BEFORE** running the machine at full speed. Check that the circuit is correctly connected and the load valve is fully open; also quick disconnect couplers **MUST** be open. **IMPORTANT**: Start the pump momentarily to ensure there is no obstruction that could cause pressure build-up.
5. Ensure that the appropriate calibration factor is entered.
6. The readout has an automatic electronic system which shuts the power off after approximately 15 minutes should you forget. To reactivate, press the ON key.

## Programming

Digital hydraulic readouts are pre-programmed with the calibration number (PPL) as follows: INTERNAL meter factor to suit the OTC 4291 100 gpm Flowblock Loading Valve. EXTERNAL meter has a standard calibration number and the actual calibration number from the flow meter must be loaded into the unit.

To program these values follow the procedure below:

PROGRAM MODE - EXT, INT and TACH.

### External Flow - EXT

1. Turn selector switch to Ext. Flow.
2. Press °C/°F button and hold down. Then press ON, i.e. two buttons are pressed at the same time.
3. On the left side of the display appears the turbine type number, i.e. 16 gpm; on the right side of the display is the standard calibration number. Use the FAST key to browse through the list of turbine types. Press UNITS to select a turbine type.
4. Use the FAST key to increment the number above the cursor. Press UNITS to move to the next column. After entering the calibration factor, press UNITS until the display overflows. The display will now show the number of digits after the decimal point. Use the FAST key to select the number of decimal places to appear on the display.
5. Press the ON button to store the entries.

### Internal Flow - INT

The internal calibration factor on the readout is factory set to the OTC 4291 100 gpm Flow Block Loading Valve when supplied together. Alternatively the internal calibration factor should be loaded by switching to INT and repeating the program instructions above.

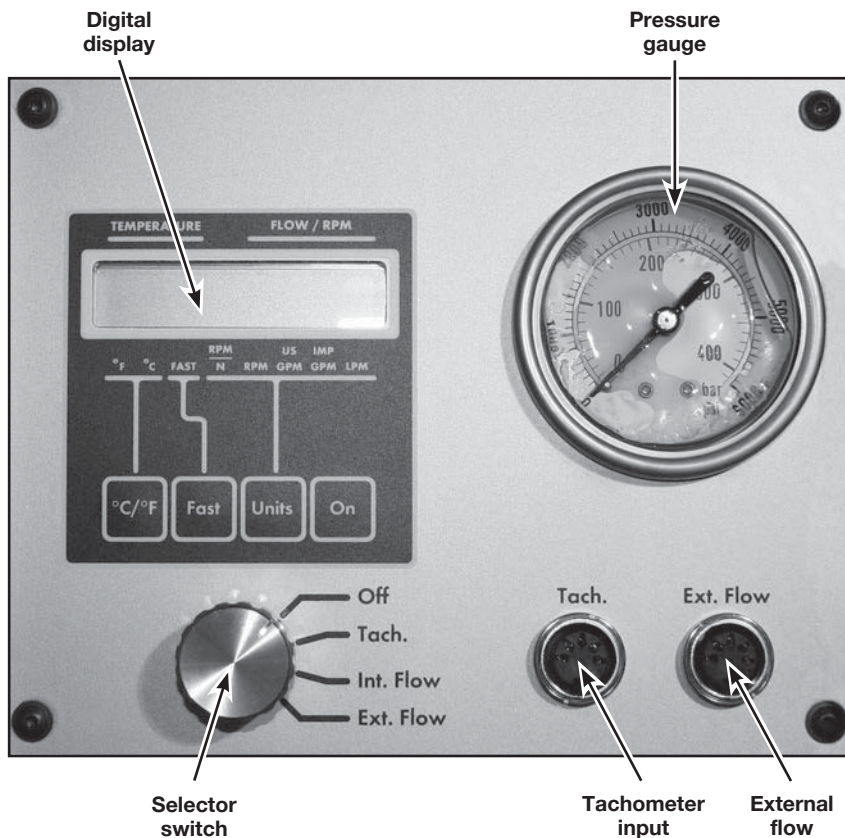
### TACH

The calibration factor for RPM is pre-programmed for a factor of 1.0. For the RPM/N function, the tachometer provides N pulses per revolution of the shaft.

To set factor N:

1. Turn selector switch to TACH.
2. Press °C/°F button and hold down. Then press ON, i.e. two buttons are pressed at the same time.
3. The display shows the current value for "N". Use the FAST key to increment the number above the cursor. Press UNITS to move to the next column.
4. Press the ON button to store the entries.

## Digital Hydraulic Readout



- **Digital display** - Digital display for flow and temperature. Automatically turns off if the unit is unused for more than 15 minutes.
- **Pressure gauge** - Analog pressure gauge, filled with glycerine to ensure good dampening when reading pulsating pressures.
- **Selector switch** - Turn the switch to select the required function.
  - **OFF** - Switches the unit off and disconnects the battery.
  - **TACH** - RPM is indicated on the display.
  - **INT FLOW** - Display flow and temperature measured by the OTC 4291 100 GPM Flow Block.
  - **EXT FLOW** - Display flow and temperature measured by the optional OTC 4290 16 GPM Flow Block (Included in the Deluxe set)

## Specification

### Connections

Flow meter connection by flexible hoses or steel pipes 8 inches minimum length (200 mm).

### Adaptors

Adaptor fitting kits and flanges are available to suit the range of flow meters. Consult the sales office.

### Flow

Measurement by the electronic count of an axial turbine designed to minimise the effects of variation in temperature and viscosity. The large digital display reads in lpm, IMP gpm or US gpm, selected by push button and indicated by a cursor arrow on the display.

**Accuracy:** See flow block specification

### Pressure

Glycerine-filled dual scale pressure gauge  
0 - 6000 psi (0 - 420 bar)

**Accuracy:**  $\pm 1.6\%$  of full scale.

### Temperature

Sensed by a thermistor pickup in the oil flow for fast response. Temperature is permanently displayed in °C or °F for either of the flow meters.

**Accuracy:**  $\pm 1$  °C (2 °F)

### Speed

Rotational speed of motors, shafts etc., can be measured by optional infrared phototachometer and the readout can be programmed for one or more reflective marks.

Range 300 - 6000 rpm.

**Accuracy:**  $\pm 1/4\%$  of full scale with one count per revolution.

### Accessories

OTC 4290 16 GPM Flow Block (included in Deluxe Set, OTC 4294)

OTC 4291 100 GPM Flow Block with Loading Valve

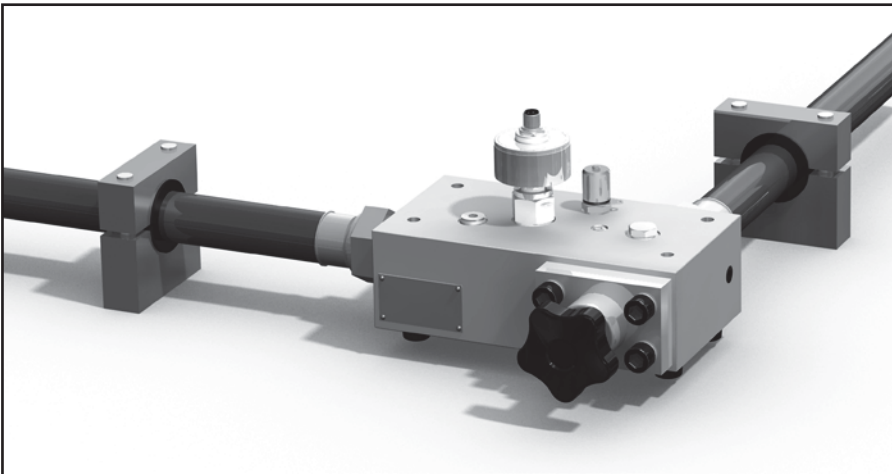
OTC 573295 Flow/Temp/Pressure Cable/Hose assembly 20 ft.

OTC 573296 Flow/Temp Cable assembly 6-1/2 ft.

## Installation guidance

- All hydraulic connections should be made by suitably qualified personnel.
- Avoid sharp bends because high pressure hoses will deflect and straighten under pressure.
- A preliminary check of the hydraulic system's oil supply, pump rotation, filters, oil lines, cylinder rods, as well as looking for external leaks, should be made prior to installing the unit.
- Although the unit can be used in both flow directions, the preferred direction is indicated by the larger arrow on the panel. When used for reverse flow tests, slightly lower accuracies may be obtained depending on the oil viscosity, density and compressibility.
- The unit should be connected to the hydraulic circuit by means of flexible hoses 3 - 6 ft. (1 - 2 metres) long.
- The use of quick-disconnect couplings can save time. Make sure the hoses are long enough so the unit can be used safely on the machine.
- The hoses and fittings at the inlet must be of adequate size for the flow being tested. Elbows, rotary couplings etc., at the inlet and outlet ports should be avoided to ensure accurate readings.
- The use of the flexible hoses will help to isolate the unit from vibration which often exists.
- The internal burst discs are to protect the unit, not the hydraulic installation. Always ensure the appropriate relief devices are fitted to protect the installation.

All hydraulic connections should be made by suitably qualified personnel. Inlet and outlet connections should always have a similar bore size to that of the flow meter to prevent venturi or constriction effects.



Flow meter shown in typical mounting.



## Maintenance and Service

### OTC 4292 Digital Hydraulic Readout Battery Replacement

- Turn the unit off.
- Remove the two screws on either end of the battery cover.
- Carefully remove battery and disconnect.
- Connect new battery, place in unit, and replace battery cover.

**Note:** Only replace with similar size and type of battery.

