



Max Machinery, Inc.
an ISO 9001:2008 certified company

Models 294/269

High Resolution, Linearized
Frequency Transmitters

Operational Manual



For Models

269-0XX-XXX

294-0XX-XXX

294-1XX-XXX

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Additional technical documents regarding transmitter performance and advanced operation are available at: <http://www.maxmachinery.com/>

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General Description

The Model 294 and 269 frequency transmitters are designed to work with Max flow meters to provide extremely precise flow measurement in a cost effective package. Different options for electrical connections and temperature ranges cover a wide range of application environments - from the laboratory to harsh industrial processes.

This latest generation of transmitters use modern sensor technology coupled with advanced signal processing to deliver new levels of performance and reliability. Hall sensors are used to detect the position of a driven magnet inside a Max flow meter. Changes in position are tracked by a microprocessor, which generates an output frequency proportional to the flow rate. Advanced signal processing provides both fine angular resolution (0.36 degrees rotation per pulse) and rapid response (output updated every ms).

These transmitters are typically mated to a mechanical flow meter, configured, and calibrated at the factory as a matched set. This ensures accuracy and allows quick setup in the field. For field installations where the transmitter has not been setup with a meter at the factory, an optional serial interface kit provides full access to all configuration options and parameters.

Transmitter Features

High resolution measurement - Configured output resolution of 1 to 1000 pulses per revolution. Linearization of up to 16 points to fully describe the flow meter's output curve and achieve the highest system linearity over the meter's entire operating range.

Compensation Algorithm - Compensates for variations in Hall sensor and flow meter characteristics to provide a stable, undamped output frequency that accurately represents the instantaneous flow rate.

Anti-Dither Pulse Buffer - Prevents undesired reverse pulses which can occur at very low flow rates in the presence of vibration or hydraulic noise. If the meter reverses direction and then resumes forward rotation, the pulse count will represent only the total forward flow. Reverse flow exceeding the pulse buffer setting will result in an output frequency proportional to reverse flow rate. The buffer quantity can be set from 1% to 100% of a revolution.



Transmitter Specifications

Supply Voltage	5-26 Vdc	
Supply Current	25-30 mA typical	
Output (5.0 Volt Supply) (TTL and CMOS compatible)	No Load	0.00 / 4.80 Volts
	2.5K Load to Common	0.00 / 4.60 Volts
	2.5K Load to +5 Volts	0.25 / 4.80 Volts
Short Circuit Current ⁽¹⁾	45 mA	
Output Impedance	100 Ω	
Rise/Fall Time	0.2 μ Sec	
Output Update Rate ⁽²⁾	1 ms	
Min/Max Frequency	0-60 kHz	
Resolution	1 - 1000 pulses/rev, Single Phase	
	1 - 500 pulses/rev, Quadrature	
Ambient Temperature Range	Transmitter (Storage) -40°C to 85°C (-40°F to 185°F)	
	Transmitter (Operation) ⁽³⁾ -40°C to 80°C (-40°F to 175°F)	
Maximum Temperature, Process Fluid (30°C Ambient, 5V supply)		
	294/269-x0x-xxx (Standard Model)	90°C (195°F)
	294/269-x1x-xxx (High Temp Model)	160°C (320°F)
	294/269-x2x-xxx (Ultra High Temp Model)	215°C (420°F)
Anti-dither Range	Software selectable from 1 - 100% of 1 revolution.	
	Default values: 50% Single Phase 2% Quadrature	
Signal Filtering	Software selectable from 1ms to 250ms time constant	

(1) Continuous Short Circuit is not recommended. The output current should not exceed 10 mA

(2) Events are seen as output transitions 1 msec after they occur

(3) Temperature of metered fluid will affect transmitter temperature, see graph

Installation - Model 269



Model 269 - Mechanical Installation

Transmitters are installed on the meter at the factory. If a transmitter needs to be replaced in the field, use the following procedure:

1. Disconnect wiring and remove the two socket cap screws to remove old transmitter.
2. Position alignment key on new transmitter with corresponding notch on the flow meter and drop into place.
3. Tighten both socket cap screws until snug. Ensure that the transmitter is not crooked, then turn screws a 1/4 turn. Do not over tighten.

Electrical Connection

This model is wired at the factory. All that is required is to connect the transmitter's mating cable into the remainder of the system as follows:

Blue: Case Ground

Black: Common

Brown: Power (+5-26 Vdc)

White: Output Signal

Programming the Transmitter

Contact the factory regarding P/N 294-100-050, user interface software.

Installation - Model 294

Mechanical Installation

1. Attach transmitter to the threaded magnet shield on top of the flow meter. Hand tighten. (~ 3 ft - lb)¹
2. If necessary, loosen set screws on the transmitter's cap and rotate to align cable as desired.
3. Ensure cap is firmly pushed down to seal O-ring. Tighten set screws.

Removal

1. Remove electrical connections
2. Unscrew transmitter, using a wrench if necessary.

Removal note: The transmitter does not need to be removed from the flow meter for any field servicing or adjustments. Normally, the flow meter and transmitter are shipped back to the factory for calibration or service as a unit. If the transmitter needs to be removed from the flow meter for installation, be sure to retighten the transmitter snugly in order to seal the o-ring and to ensure proper sensor alignment.

Moisture Protection

On all models, the housing is designed as a liquid and vapor-tight enclosure. There are o-ring seals at the lid and base of the housing - these both need to be fully seated. A properly sealed transmitter will prevent the formation of damaging moisture inside the housing.

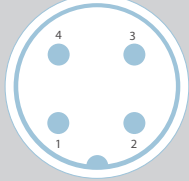
Turck connector Model: The connector is sealed to the lid at the factory and is ready for use.

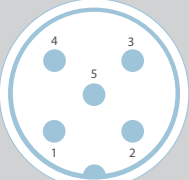
NPT Model: To ensure a moisture-tight seal, apply appropriate sealant to the threads at installation.

¹ Transmitter may be wrench tightened up to 15 ft - lb if it will be subject to vibration or loads. This additional torque causes relative movement between transmitter and meter, so to ensure optimal performance, request that the factory apply the extra torque before calibration / compensation, or run the compensation program in the field after tightening.

Electrical Installation - Wiring

The electrical connector versions are pre-wired inside the transmitter and ready to accept a mating cable (available from the factory). The liquid-tight, NPT models need to be wired during installation as shown in the table below:

Frequency Single Phase	NPT model	4-Pin Connector		
	Connector Terminal #	Mating Cable Wire Color	Pin #	
Case Ground	In-lid	Blue	3	
Common	1	Black	4	
Power 5-26 Vdc	2	Brown	1	
Pulse Output	3	White	2	

Frequency Quadrature	NPT model	5-Pin Connector		
	Connector Terminal #	Mating Cable Wire Color	Pin #	
Case Ground	In-lid	Blue	3	
Common	1	Black	4	
Power 5-26 Vdc	2	Brown	1	
Output Phase A	3	White	2	
Output Phase B	4	Grey	5	

Rotation/Output Indicators

The red/green rotational indicating LED (D2) will be illuminated when the circuit has power. One side will always be lit. The color will depend on where the meter stops in its rotation. The yellow signal LED's illuminate only when the sensor output is "high".

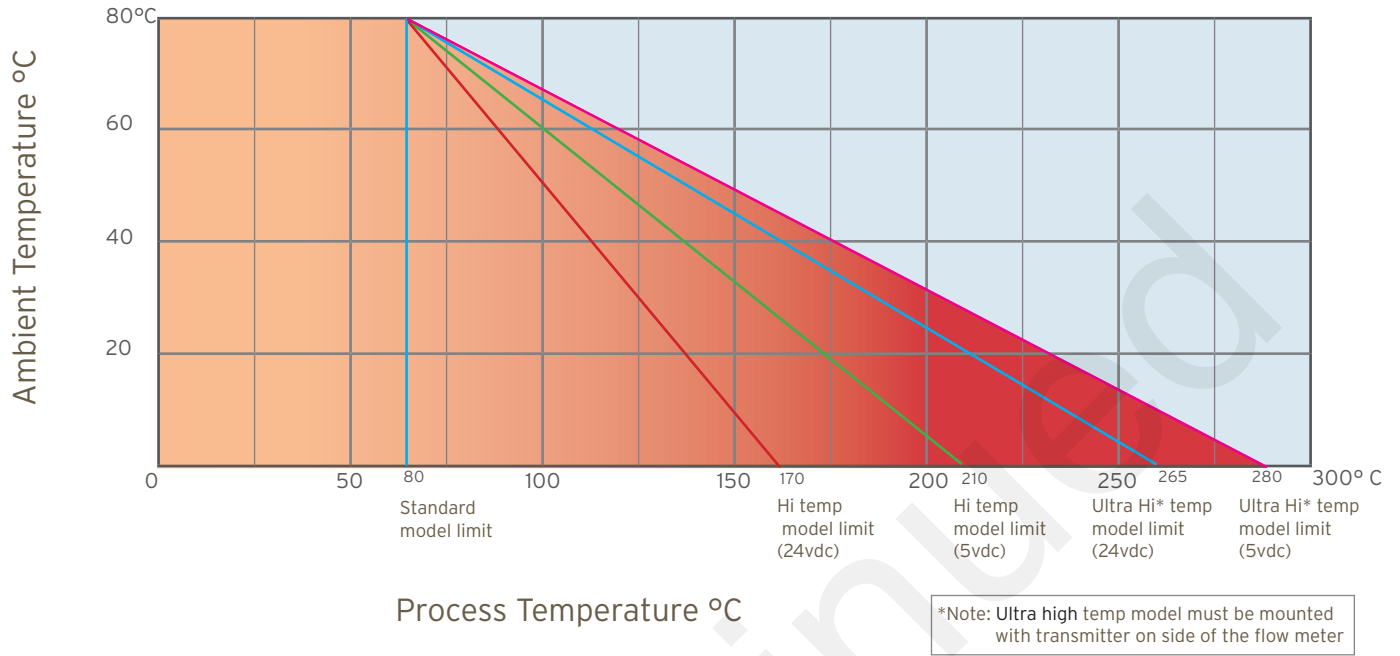
Note: There are no selections or adjustments to be made on the circuit board. The only method of altering the setup parameters is through the Serial Interface Program. (see manual)

High temperature operation above 65°C (150°F)

The operating limit of the meter/transmitter is a function of both the ambient and the metered fluid temperature, as shown in the graph below. Although the electronic components are rated to 80°C (175°F), additional heat can be conducted from the flow meter into the transmitter housing requiring a lower ambient temperature limit for high fluid temperatures.

To prolong the life of the transmitter and reduce the risk of component related failures over time, high ambient temperatures >65°C (150°F) should be avoided if possible. It is a good idea to locate the transmitter away from hot spots such as steam pipes, ovens and heaters. When working with elevated fluid temperatures >65°C (150°F), insulating the flow meter is recommended to reduce the risk of burns, and to reduce the heating of the electronics by convection of hot air off of the meter (especially for larger meters). The upper temperature limits shown in the curves rely on ambient convection to remove heat from the transmitter housing, cooling the electronics. For this reason, if operating near the upper temperature limit, the transmitter should not be insulated. At these elevated temperatures, the transmitter will be very hot - exercise appropriate caution.

Temperature Limits Model 269 Transmitter Series



Temperature Limits Model 294 Transmitter Series

