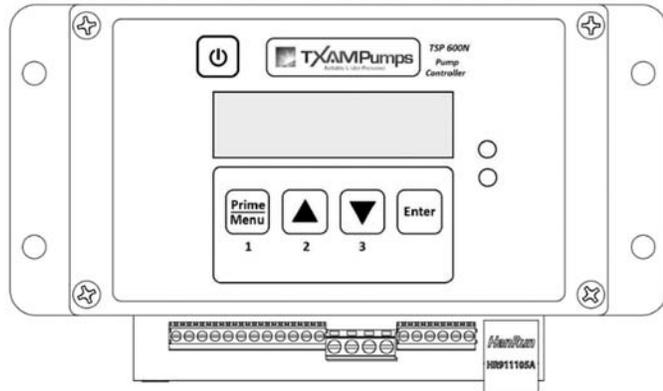


TSP 600N SCADA Pump Controller

The TSP 600N is TXAM's SCADA automation controller which can be tied into the customer's SCADA network via Modbus, however, all modes of operation can be used if SCADA connectivity is not being utilized. If SCADA connectivity is being utilized, coordination with the customer's I&E personnel during installation is required.



The TSP 600N utilizes stroke counting to maintain rates, with a timer mode as an emergency mode of operation. During the initial installation, TSP 600N is calibrated for a *quarts per stroke* (QPS) value and delivers groups of a set number of strokes to achieve the target rate or injection. Utilizing stroke counting, as opposed to time based control (i.e. cycles and duration settings), the TSP 600N has a virtual flow meter since the volume of each stroke is known. With a known stroke volume and a known number of strokes, a total volume is calculated.

There are two methods of counting the pump strokes; using the patented current stroke sensing device imbedded in the TSP 600N (DC applications only), or using an inductive sensor mounted to the pump. The current stroke sensor senses current spikes created by the load on the motor during discharge strokes. Injection pressure is important because at little to no back pressure, the TSP 600N will not sense each stroke and cause errors. In low pressure applications, certain check valves can be used to provide adequate back pressure. An inductive sensor is used in AC applications (or any application if desired), and simply senses a magnet placed on the drive block when it comes within the specific range. This sensor is wired to dedicated terminals on the controller (C1D2 sensors available).

The TSP 600N modes of operation include **Timer mode**, **QPD mode**, **Proflo mode**, **H2S mode**, **Dynamic Temperature Control mode**, and a very rudimentary batch mode. All modes of operation (except timer mode) require stroke sensing, and stroke volume needs to be calibrated before any mode and/or rate is selected.

Timer Mode – In Timer mode, simply set cycles per minute and seconds per cycle. This mode would likely only be used in emergency situations.

QPD mode - In QPD mode, after calibrating the stroke sensor and stroke volume, simply select a rate (QPD) and the pump will maintain that rate until another rate is selected.

Proflo Mode – In Proflo mode, a 4-20 mA signal is sent from a production flow meter or an analog output from a PLC representing the production flow. In this mode, the set point is the desired dose concentration (PPM). The injection rate is calculated based on the production flow and the desired PPM. Because this mode requires calibration of the incoming 4-20 mA signal, coordination with the customer's I&E personnel during installation is required.

H2S Mode – Similar to Proflo mode, H2S mode utilizes a 4-20 mA signal from the H2S analyzer to represent H2S presence. However, in H2S mode, a QPD set point is used as a max injection rate and the rate is scaled in a linear fashion based on H2S presence. For example, the user will select a minimum and maximum H2S range. We'll use 0 and 6 ppm in this example; 0 is represented by 4 mA and 6 ppm is represented by 20 mA. Then select a QPD rate. In this example we'll use 80 QPD. When all parameters are set, the rate will scale linearly from 0 QPD at 0 PPM to 80 QPD at 6 or more PPM. Because this mode requires calibration of the incoming 4-20 mA signal, coordination with the customers I&E personnel during installation is required.

Dynamic Temperature Mode – Dynamic Temperature mode functions similarly to H2S mode. The user will select a minimum temperature, a maximum temperature, and a QPD set point; we'll use 40 QPD in this example. Then, the rate will scale linearly from 0 QPD at and above the maximum temperature to 40 QPD at and below the minimum temperature. This mode uses the supplied temperature sensor.

Batch Mode – In Batch mode the user selects a start time, active minutes, inactive minutes, and a QPD set point. The start time is only for the initial start. For example, if the user selects, 11:00 AM as the start time, the controller will start the batch and continue indefinitely.

Alarms – The TSP 600N offers alarm bits via Modbus. Some of the alarms include Simulation mode (lost strokes), Dynamic Temperature mode on and active (2 different bits), and low voltage. There are other registers in the Modbus map which give conditional values such as Proflo errors and mode of operation. See the field manual for the full Modbus map.

Miscellaneous info

- The TSP 600N operates on 12 volts DC. In AC applications, an AC kit is required. This AC kit includes an AC to DC power supply and a relay controlled by the pump controller. (AC applications require the use of an inductive sensor).
- The TSP 600N includes a tank level sensor which is mounted on the tank manifold. Typically, no calibration is required; only specific gravity of chemical and sensor dead height need to be set.
- The TSP 600N only reports the tank level in inches; no volume is reported. Volume can be calculated in the customers SCADA system.