
QTRAC 1000 Traction Control System

The QTRAC 1000 Locomotive Traction Control System is a standalone unit that monitors and controls locomotive wheel slip by reducing excitation to the main AC (or DC) generator when wheel slip is detected. This is common when lifting or transporting heavy loads, and under poor track conditions such as ice, snow or rain.

Real time detection and response to wheel slip problems routinely allows higher adhesion coefficients for train dispatch. QTRAC 1000 also controls rail sanding, and provides increased performance due to the tractive effort gained from the Wheel Creep Control feature.

The QTRAC 1000 is currently available for most GM/EMD locomotives, and is readily adaptable to others.

The QTRAC 1000 also:

Monitors diagnostics of all QTRAC 1000 inputs and outputs, including:

- Some Contactor and Relay positions.
- Traction Motor Currents (6 on SD units; 4 on F9 and GP units).

Records and stores Alarms (450 alarms):

Includes a “snapshot” of all Input/Output data at the time of the alarm occurrence.

- In Alarm data mode, view the complete I/O data on the QTRAC 1000 Liquid Crystal Display (LCD) at the time of the alarm occurrence.
- Download Alarm data to an external computer and view it using the Q-Tron Universal Analysis/Download Software (QUADS) program.

Monitors total:

- Horsepower Hours.
- Kilowatt Hours.
- Hours.
- Miles.

System Overview

- The QTRAC 1000 Wheel Slip/Creep Control operates in both Power- and Dynamic Braking mode. The QTRAC 1000 continually self-checks its memory and internal circuits, and provides diagnostics information to aid while testing and troubleshooting the system.
- The QTRAC 1000 can be used with a computer interface to download and view alarms that are recorded by the system when irregular Wheel Slip operations occur.
- Current transducers for each Traction Motor (TM) detect traction motor irregularities such as pinion slip, and short or open circuits.
- QTRAC 1000 module mounting hardware is available for Dash 2 and non-Dash 2 locomotives.

System Performance

The QTRAC 1000 Traction Control system is an economical way to significantly boost track adhesion and locomotive performance. The QTRAC 1000 controls wheel slip/creep in power and dynamic brake operation by reducing excitation to the main generator when wheel slip is detected in one of the axles. The result can be as high as a 34% improvement in track adhesion under poor rail conditions.

Motor Protection

The QTRAC 1000 senses armature currents on all traction motors. By comparing motor currents, the QTRAC 1000 provides open Traction Motor protection and Pinion Slip protection.

If the average Traction Motor current exceeds 50 amps and the armature current of one motor is 25 percent higher (or lower) than average current, a SLIP PINION alarm is set. If this happens, Rate Control is set to zero and the Generator Field (GF) output opens. After 3 seconds, the Generator Field output closes and the Rate Control ramps up.

If average Traction Motor current is greater than 100 amps and armature current in a motor is less than 50 amps, a TM OPEN alarm is set. If this happens, Rate Control is set to zero and the Generator Field output opens. After 3 seconds, the Generator Field output closes and the Rate Control ramps up.

By receiving the speed signals from all axles, the QTRAC 1000 can protect against locked axles and axle overspeed. If average speed is higher than 3 MPH and one axle is detected to be less than 1 MPH, an AXLE LOCKED alarm is displayed and Rate Control is reduced. If an axle speed exceeds 73 MPH an OVERSPEED alarm is set and Rate Control is reduced.

Traction motor temperature is calculated based on cooling air temperature, the amount of cooling air, and traction motor current. If the temperature of the traction motor exceeds 180°C, excitation is reduced to limit the traction motor current. This prevents damage to the traction motor.

Wheel Slip/Creep Control

Wheel slip/creep control operates in both DB and Power. The **speed based** control system utilizes 120 pulse per wheel revolution (PPR) speed signals from each axle through the use of axle generators. The system controls wheel slip by monitoring absolute acceleration of each axle. If an axle accelerates too quickly the main generator excitation is reduced just enough to control the wheel slip, providing as much tractive effort as rail conditions permit.

The **current based** control system monitors traction motor current transducers, main generator voltage and current, and differential voltage modules. After analyzing these signals, the QES III system adjusts system power to the traction motors.

The Wheel Slip/Creep Control system allows the wheels to creep at 1–2 MPH above track speed. As wheel slip increases, main generator power decreases. Power to the traction motors is cut quickly and then reapplied to just below the amperage level at which the wheel slip occurred. The controlled power levels result in continuous wheel creep to provide a significant increase in adhesion over conventionally equipped locomotives.

Miscellaneous

Interface Panels are available for controlling main generator excitation or D32 equipped locomotives.

QTRAC 1000 Display Panel

The display panel provides access to the various functions performed by the QTRAC 1000. The QTRAC 1000 panel displays the data for diagnostics, operation of Speed Control, and the self-tests. The display also provides the viewing screen for checking Totals, viewing Alarm Data, and entering Setup Parameters.

The QTRAC 1000 display consists of a 4-line by 20-character alphanumeric Liquid Crystal Display (LCD), and a 12-button keypad for selecting program functions and inputting information. The QTRAC 1000 interfaces with the laptop computer using a serial (RS-232) cable link. Figure 1 displays the layout of the QTRAC 1000.

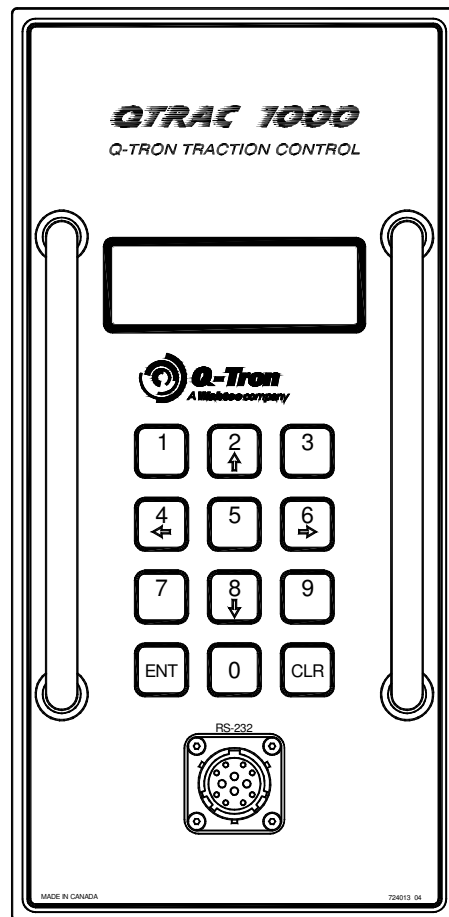


Figure 1. QTRAC 1000 display panel