

## Autogard 400 Series Protects Main Cutter Head Drive Train on Tunnel Boring Machine (TBM)



**Loch Ness, Scotland**

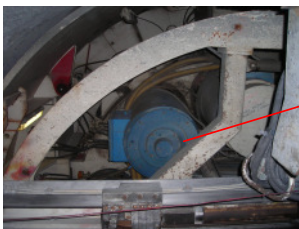
A 5m diameter, 8km long tunnel was constructed for a major UK utility. The turbine outflow emerges into Scotland's famous Loch Ness.



**Tunnel Mouth**  
(Tunnel under construction)

The TBM cutter head is driven by 7 x 250kW electric motors. An Autogard 400 series size 6 torque limiter is fitted to each motor to protect the shafts and gear train driving the head. If an overload occurs on any one of the drives, the torque limiter disengages immediately to prevent costly damage and downtime. The 400 series was chosen for its ease of resetting. This is achieved automatically by simply reversing the drive slowly. If one of the Autogards trips, this is sensed by load monitors on the drive. A reset sequence is then started and in only a few minutes, the drive is re-engaged and boring can recommence. Other types of torque limiter require manual intervention for resetting. The location is extremely difficult for access and working space is limited. Consequently, resetting times are much longer (it can take several hours) with these other systems.

400 series location  
(inside motor housing).



The units installed on the Loch Ness machine have been in virtually continuous operation for one year. Other units are installed on machines in the Swiss Alps and in Austria.

### Specification

Autogard 400 series torque limiter  
 Model 404-6 Special to 4F0037  
 Automatic reset in < 30° reverse rotation  
 Hubs Splined N75x3x30x24x9H to DIN 5480  
 Torque setting 5650 Nm max +/- 5%  
 Max operating speed 2000rpm  
 Mass 52kg

