

# Modern pump monitoring with IO-Link

Although about two-thirds of the earth's surface is covered by water, there is an equally large proportion of the world's population living in areas that suffer water scarcity. The groundwater is increasingly polluted for different reasons. As a result, drinking water is the most common cause of illness worldwide. If current usage trends don't change, the world will have only 60 % of the water it needs in 2030.

**To ensure a reliable water supply, Midvaal Water Company, from South Africa, relies on modern remote monitoring.**

Therefore, ifm's goal must be to help their customers to save water. Innovative automation solutions are easy to implement and help companies to achieve savings in water, energy and maintenance.



*The high-lift pump station of Midvaal Water. The five newer motor-pump sets (grey motor housing) were equipped with IO-Link sensors and condition monitoring solutions.*

The Midvaal Water Company is a water service provider supplying potable water in bulk to South Africa, serving an area of some 900 km<sup>2</sup>. Situated on the banks of the Vaal River, the company purchases raw untreated water and after purification, delivers it to consumers. In addition to this, Midvaal renders operation, maintenance and consultancy services for water treatment plants and sewage works.



*“In addition, wiring failures could easily occur due to the significant amount of cables, resulting in complex reworking.”*

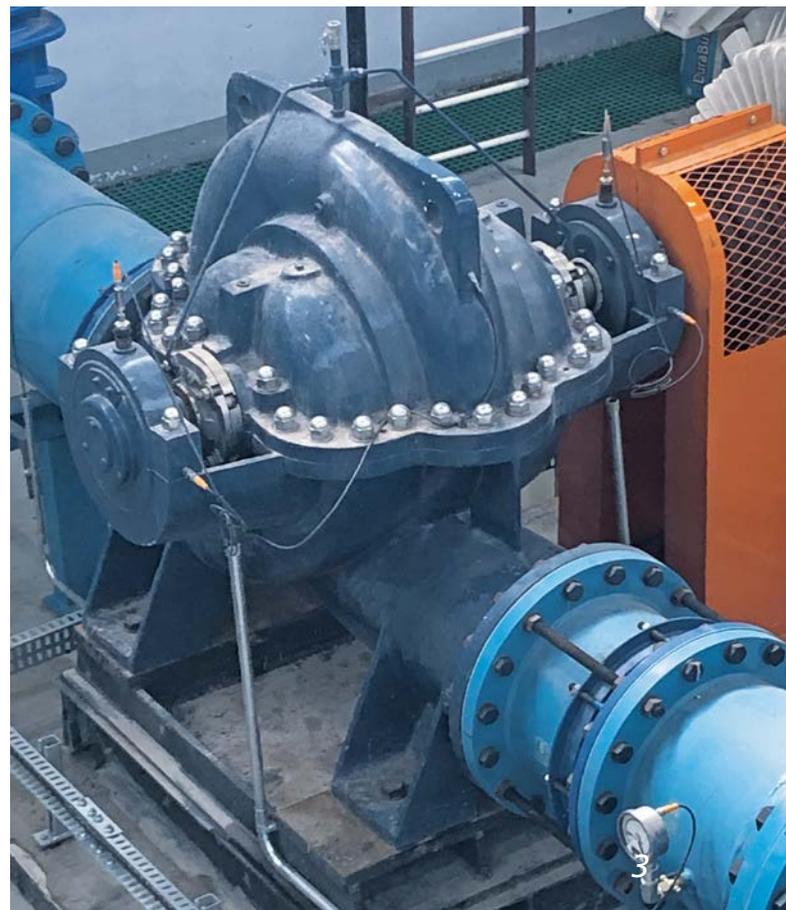
Midvaal wanted an innovative and easier solution that would enable reliable control of the pumps and motors of the high-lift pump station as well as remote monitoring to schedule timely maintenance tasks, ensuring performance and preserving the value of the pump station for the long term.

### ■ Contemporary, simple system for remote monitoring

In September 2019, the non-profit organisation decided to refurbish one of its high-lift pump stations. Traditionally, these stations were equipped with analogue sensors and standard infrastructure.

*“In the past, it took our technician a week to connect a pump in the station to the PLC due to the complex wiring structure”,* said **Mark Richards**, Maintenance Manager at Midvaal.

*Several sensors measure the values of pressure, temperature and vibration.*



*The pressure sensor PG2454 shows the current value on an easy-to-read display on site and also transmits it digitally via IO-Link.*

In a pilot project, five sets with motors and pumps were equipped with control and monitoring sensors as well as the corresponding infrastructure. Each of these sets consists of a 600 KW motor with 3.3 KV supply and a pump that can raise 43,000 litres of water per minute to a height of 60 metres. In addition, condition monitoring, sump level control and pressure monitoring of inlet and outlet was implemented.

### ■ Vibration monitoring expertise at ifm: everything from a single source

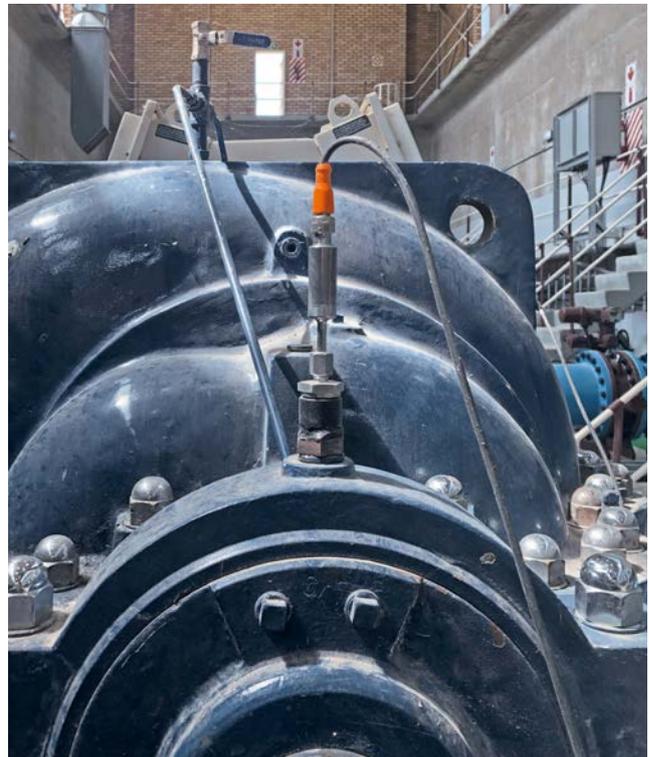
Several factors led Midvaal to choose ifm as their automation partner for project implementation.

*“ifm initially presented their solution to us at a trade fair and we were convinced right away. The smart wiring with lower cable requirement, the possibility of transmitting data to the PLC via Ethernet and the storage of historical data in the diagnostic electronics all represented real added value for us,”* said **Richards**.

*“The collaboration also meant that we didn’t have to hire an external vibration expert, as ifm delivered professional advice and full implementation support, e.g. by ensuring that all limit values were set correctly. Even today, ifm’s experts assist us with their long-standing expertise in vibration diagnostics whenever we need help in analysing the historical data.”*

Together with the engineering office Wasterspec cc and system integrators from APJ Automation, the ifm experts implemented the automation and condition monitoring solution. It comprises VSA001 vibration sensors whose data are evaluated by a VSE151 diagnostic unit. Combined with the temperature sensors, they provide the required data to ensure continuous monitoring of system health and visibility of the maintenance requirements of the motor and pump. In addition, PG2454 pressure sensors are used for pressure monitoring at the inlet and outlet of the pump – both remotely and on site via an analogue display.

The pressure and temperature sensors are connected to AL1122 IO-Link-Masters using standard M12 connection technology. This type of master features an EtherNet/IP interface enabling simultaneous data transfer to the PLC and IT system. The same applies to the vibration sensor data, since the VSE151 diagnostic unit also communicates directly with the PLC and the IT system via an EtherNet/IP interface.



*To get a clear and transparent view on the health-state of the motor, the bearing temperature is measured...*

*...as well as the vibration behaviour at the bearings and the motor speed.*



” From the sensor to the infrastructure to the IT level, ifm provides an integrated system, from a single source.



Before using IO-Link, two of these cabinets with analogue cards were needed to record the values of the sensors.



All values can be monitored on a display on site and remote.

■ Installation time reduced by 80 percent to one week

The installation time of the sensors was significantly reduced thanks to IO-Link.

“The installation time of five pump and motor sets used to be five weeks with hardwired technology. With the modern wiring structure, which is primarily based on IO-Link, the time required is also one week – but for all five pumps,” said Richards.

In addition to saving installation time, the condition of the pump station can now be monitored remotely. The condition monitoring software is also provided by ifm.

“From the sensor to the infrastructure to the IT level, ifm provides an integrated system, from a single source. This means that we have a single point of contact at ifm for all questions that may arise and receive fast and competent support at all times.”



With IO-Link, fewer cables and less space are required. Midvaal Water was able to reduce installation time by 80 percent.

■ Bottom line

The motor-pump monitoring solution meets the customer’s requirements for predictive maintenance, online condition monitoring, sump level control and pressure monitoring of the inlet and outlet. Also, the fault-finding time is reduced thanks to IO-Link and less terminations. This helps to reach a reliable protection of valuable assets of motors and pumps. The Midvaal Water Company is rightly very proud of what it has achieved in owning a plant that is one of the most innovative pumping stations in South Africa.