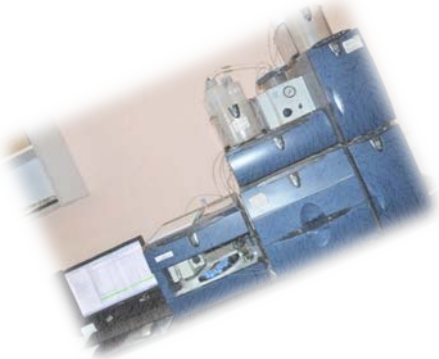
National Water Research Center
المركز القومى لبحوث المياه

Instruments of the
National Water Research Center



1. Hydraulic and Marine Instruments

1.1. Acoustic Doppler Current Profiler (ADCP)

It is used to measure water current velocities over a water depth based on scattering the sound waves back from particles within the water column, where the frequency shift of the echo is proportional to the water velocity along the acoustic path. Its application by NWRC is to measure water discharge and flow velocity in the Nile river and streams.

1.2. Multi-Beam Echo-sounder

It is a type of sonar that is used to map the seabed by measuring the time from emitting sound waves from beneath a ship's hull to the seabed and returning back to a receiver. Its application by NWRC is through conducting the bathymetric survey for Nasser lake, the Nile river and sea.

1.3. CS456 Titanium Pressure Transducer

It is used for water-level measurements in open channels, wells, harbors, lakes, and tanks. It can be used in saltwater, as it has a rugged titanium case. Its outputs are either a digital SDI-12 or RS-232 signal to indicate observed pressure and temperature, which can be read by a data logger.

1.4. Water Level and Electrical Conductivity Device

It is used for measurement of electrical conductivity, temperatures, and water levels in open channels and groundwater wells. Its applications at NWRC include the bathymetric survey for Nasser lake and Nile river as well as measuring water levels and salinities along streams.

1.5. FH950 Portable Velocity Meter with Electromagnetic Sensor

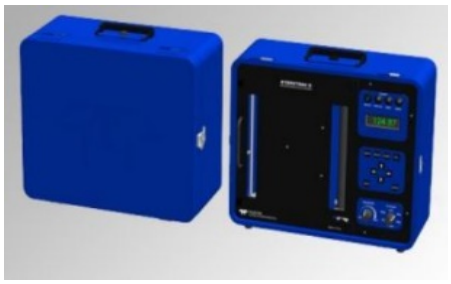
It is used for measurement of water velocities and water levels in open channels, and accordingly, for calculating water discharges. It is used by NWRC for calibrating the velocity meters, weirs and flumes.

1.6. Current Meter

It is used for measurement of the water velocity in waterways by a propeller mounted on a rod. It is applied at the NWRC for measuring the water velocities in a number of branch canals, as the measured velocity range of the instrument is from 0.025 to 10 m/sec.

1.7. Hydrotrac

It is an echo sounder which is used for measurement of water depths up to 100 m. It is used by NWRC to determine the offshore water depths and Nile river and Nasser lake in addition to a number of research studies.



1.8. Ultrasonic Flow Meter

It is used to measure the average flow velocity and discharge along the path of an emitted beam of ultrasound, by averaging the difference in measured transit time between the pulses of ultrasound propagating into and against the direction of the flow. It is applied by NWRC for measuring the discharges of pipes in prototypes and physical models.

1.9. Magnetic Flow Meter

It is used to measure the flow and velocity of water inside pipes by the voltage induced across the water through a magnetic field. It is applied by NWRC for measuring discharges of the pumping units and discharges used in the physical models.

1.10. Pressure Transducer

It is used to monitor the water pressure inside pipes by converting an applied pressure into a measurable electrical signal. It is used by NWRC for measuring the pressures in the pumping stations for drainage water reuse.

1.11. Digital/Analog Pressure Gauges

They are used to sense the pressure from the water inside pipes and provide a direct reading on a digital display. They are used by NWRC for measuring the pressures in the pumping stations for drainage water reuse.

1.12. Dead Weight Tester

It is used as a calibration standard to calibrate pressure-measuring instruments. It is applied at NWRC for calibrating the pressure instruments.

1.13. Valeport (Model 801 - Flat Type)

It is used to measure the water velocity in open channels up to 5 m/sec, and for water depths from 5 cm to 10 m. It is applicable by NWRC in open channels and the Nile river.

1.14. Lowrance Elite 7 CHIRP

It is used to find the water vegetation and fishing spots by displaying a detailed view beneath the water surface. It is applied by NWRC for quantifying vegetation intensities in streams.

1.15. Siemens Ultrasonic Flow Meter

It is used for measurement of discharges inside pipes with diameters from 6 to 10 mm, and for discharges up to 12 m^3/sec. It is used by NWRC for laboratory measurements of pipes.

1.16. Current Meter Truck

It is used to calibrate all types of current meters. It is applied by the NWRC for calibrating the current meters in both physical models and field applications.

2. Groundwater Instruments

2.1. SAS 4000

It is used for groundwater exploration by measuring the electrical resistivity imaging. It is used by NWRC in Sinai and North Coast.

2.2. Zonge

It is used for acquisition of controlled- and natural-source geo-electric data. It is applied by the NWRC to provide an overview of groundwater quality and the subsurface geological structure.

2.3. GPR (SIR 4000)

It is used for exploration of the subsurface materials and for encountering the interface of two materials having different dielectric properties. It is applied by the NWRC to track the groundwater flows.

2.4. Syscal II

It is a geophysical equipment for exploring and monitoring the earth resources. It is applied at NWRC for providing the geological structure of groundwater aquifers up to depth 400 m.

3. Water Quality Analysis Devices

3.1. Manta2

It is used for water quality analysis for various parameters namely; pH, Turbidity, Chlorophyll-a, Dissolved Oxygen, Conductivity, Blue-green Algae, Crude Oil, Nitrate, and Temperature. It is widely used by the NWRC for water quality monitoring in streams.

3.2. CX-401

It is used to measure pH, Electrical Conductivity, Total Dissolved Solids, Dissolved Oxygen, Atmospheric Pressure, and Temperature. It is applied by the NWRC for water quality analysis in a number of irrigation canals, drains, Grey Wastewater Treatment Units, and in Hydroponic systems.

3.3. Multi 3400i

It is used to measure Salinity, Alkalinity, and Dissolved Oxygen. It is applied by the NWRC in a number of canals and drains.

3.4. LC-MS/MS Triple Quad Agilent

It is used to identify each compound in mixtures by separating each compound and quantifying the number of ions that enter the mass spectrometer. It is available at the NWRC.

3.5. Inductively Coupled Plasma- Mass Spectrometer Perkin Elmer NexION 300D

It is used for measurement of heavy and trace metals in water, soil and fish in less than three minutes by creation of a nomenclature of pure materials of the isotopic composition of the elements. It is available at the NWRC.

3.6. Ion Chromatography Thermo Scientific Dionex 5000

It is used for measurement of anions and cations in water by pathing the sample inside a column capable of separating each ion. It is available at the NWRC.

3.7. Agilent GC –MS 7890A with Triple-Axis Detector MSD & Headspace Sample

It is used for measurement of organic compounds in water by comparing their mass spectra of nuclear ions with standard spectrums. It is available at the NWRC.

3.8. Flame Photometer (BWB XP)

It is used for measurement of Sodium, Potassium, Lithium, Calcium, and Barium in water by identifying the light sourced from each parameter in case of exposure to flame. It is available at the NWRC.

3.9. Spectrophotometer (Orion-Aqua Mate 8000 UV – Vis)

It is used for measurement of Phosphorus, Nitrate, Nitrite, Ammonia, and Suspended Solids by measuring the reflection or transmission properties of a material as a function of electromagnetic wavelength. It is available at the NWRC.

3.10. Water Quality Monitoring Vehicle

It is a mobile laboratory for measuring the water quality of groundwater and surface water. The vehicle comprises of two electric generators, refrigerators, a number of instruments. There are three vehicles available at the Drainage Research Institute, Nile Research Institute, and the Groundwater Research Institute at NWRC.

3.11. Conductivity TDS meter with Electrode

It is used for measurement of Total Dissolved Solids. It is applicable by the NWRC for quantifying the change in water salinity in different aquifers.

3.12. Field Monitoring Unit

It is a group of sensors, which can measure Dissolved Oxygen, Salinity, Alkalinity, and Temperature. It is applicable by the NWRC for field water quality monitoring in a number of drains in the Nile Delta region.

4. Hydrographic Survey Instruments

4.1. GPS Leica Viva

It is used to identify the global coordinates with an accuracy up to 1 mm. It is widely applicable by the NWRC.

4.2. Latitude 7424 Rugged Extreme

It is used for a hydrographic survey in the harsh marine environment. It is based on the eighth generation of Intel Core, and has highs (an extra-bright screen) and lows (an unusable touchpad). It is applicable by the NWRC inside marine boats for investigating the sea environment.

4.3. Total Station

It is an electronic transit theodolite integrated with electronic distance measurement to measure both vertical and horizontal angles and the slope distance from the instrument to a particular point. It is used by the NWRC for conducting the bathymetric survey for the Nile river embankments and Nile islands.

5. Environmental Monitoring Instruments

5.1. YES AIR plus

It is used for measurement of Ammonia, Arsine, Carbon Dioxide, Carbon Monoxide, Chlorine, Chlorine Dioxide, Ethylene, Ethylene Oxide, Fluorine, Formaldehyde, Hydrogen, Hydrogen Chloride, Hydrogen Cyanide, Hydrogen Fluoride, Hydrogen Sulfide, Methane, Nitric Oxide, Nitrogen Dioxide, Oxygen, Ozone, Phosphine, and Sulphur Dioxide in air. It is available at the NWRC.

5.2. Ion Science Tiger

It is used for a rapid detection of volatile organic compounds in air. It is available at the NWRC.

5.3. Casella CEL 246

It is used to display the time history of noise levels. It is available at the NWRC.

5.4. Casella WBGT

It is used to measure the heat stress in direct sunlight, which takes into account: temperature, humidity, wind speed, sun angle and cloud cover. It is available at the NWRC.

5.5. Casella CEL 712

It is used for detection of airborne dusts, fumes and aerosols in air. It is available at the NWRC.

5.6. Casella: CEL- 960

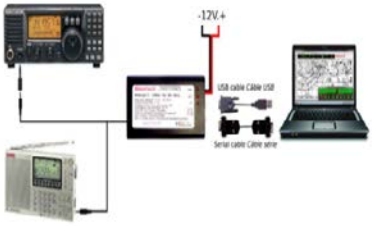
It is used for the measurement of hand-arm and whole-body vibrations. It is available at the NWRC.

5.7. Go-Pro Hero 4

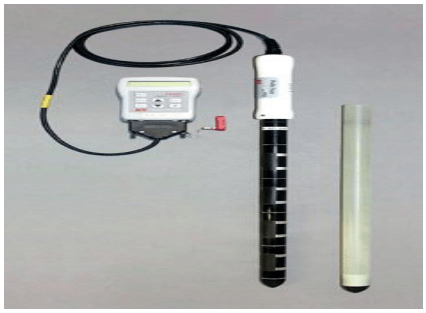
It is used for capturing videos and photos under water up to 30 frames per second for monitoring the behavior of living creatures in rivers and seas. It is available at the NWRC.

5.8. Integrated System (METEOFAX32 - Weather IC - Radio-Fax Decoding Modem - M802 decoding software)

This system is used for receiving maps and reports about meteorological and marine features and urgent navigation alarms without connecting the internet. It is used by the NWRC along Egyptian coasts.



6. Soil Characteristics Instruments



6.1. PRO-PROB

It is used for measurement of soil moisture without holding probe at each depth. It is applicable by the NWRC for quantifying the water quantity required for irrigation in a number of field experiments.

6.2. Magnetometer

It is used for measurement of magnetism or relative change of a magnetic field at a particular location. It is available at the NWRC.

6.3. Seismic Intensity Device

It is used for categorizing the severity of ground shaking at a particular location. It is applicable by the NWRC for providing the geologic structures of earth in specific locations.

6.4. Proton Magnetometer

It uses the principle of Earth's field nuclear magnetic resonance to measure the Earth's magnetic field. It is used by the NWRC for identifying the depth of the Nubian Sandstone Aquifer and for drawing geologic maps in a number of case studies.

6.5. Dilatometer

It is used for measurement of physical or chemical changes in soil by passing electrical current to the underground. It is applicable by the NWRC to measure the soil resistance, mechanical and physical characteristics.

6.6. Vane Shear Device

It is used for measurement of the undrained shear strength of a cohesive soil by measuring the required torque causing failure of the soil. It is applicable by the NWRC to measure the soil cohesiveness in a number of field tasks.

6.7. Triaxial Test Device

It is used for measurement of the mechanical properties of deformable solids, especially soil. It is available at the NWRC.

6.8. Cone Penetration Test

It is used to determine the geotechnical engineering properties of soils and delineating soil stratigraphy. It is available at the NWRC.

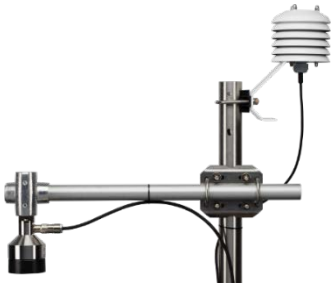
7. Hydrological Measurements Instruments

7.1. SUTRON (SDR-0001-1 and RLR-0001-1)

It is a Wireless Sensor Network for measuring the flash floods' water levels. It is available at the NWRC.

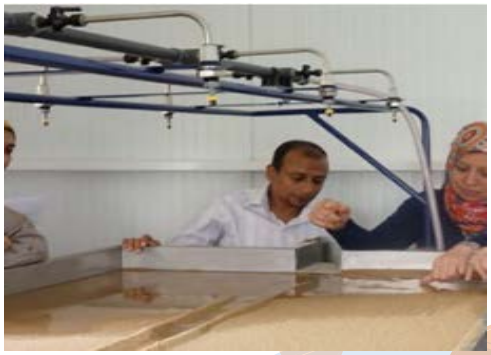
7.2. Sonic Ranging Sensor (SR50A-L)

It is used for measuring the flash floods' water depths by emitting an ultrasonic pulse and then measuring the elapsed time between the emission and return of the pulse. It is available at the NWRC.



7.3. Hydrology System (S12-MKII)

It is a physical simulation models representing water basins, precipitation, and groundwater discharges. It is applicable by the NWRC for finding the precipitation-runoff correlation and groundwater discharges in a number of case studies.



8. Mechanical and Electrical Equipment

8.1. Dead Weight Tester

It is used for calibrating the pressure measurement devices. It is applied to calibrate all pressure devices of the NWRC.

8.2. Welding Tester (EPOCH)

It is used for spot weld inspection by generating multiple back wall echoes at a high frequency. It is used by the NWRC for detecting the welding failures in piping networks of pumping stations of Ministry of Water Resources and Irrigation.

8.3. Minerals' Thickness Device

It is used for measurement of minerals' thickness up to 25.4 cm based on ultrasonic technique. It is used by the NWRC for measuring the thickness of piping networks in the pumping stations of Ministry of Water Resources and Irrigation.

8.4. FLUKE – Electrical Parameters

It is used for detecting the current and voltage. It is used by the NWRC for monitoring the electrical changes in different components in the pumping stations of Ministry of Water Resources and Irrigation.

8.5. FLUKE – Electrical Isolation

It is used for measuring the extent of isolation for generators, cables, and control panels. It is used by the NWRC for monitoring the isolation of different components in the pumping stations of Ministry of Water Resources and Irrigation.

8.6. Vibration Measurement Devices

It is used for measurement of machinery vibrations as an indication of the mechanical performance of machines. It is used by the NWRC for evaluating the machines of pumping stations of Ministry of Water Resources and Irrigation.

8.7. Rotational Colum Alignment Device

It is used for alignment of crane columns and adjustment of machinery rotational shafts. It is used by the NWRC in the pumping stations of Ministry of Water Resources and Irrigation.

8.8. Thermal Camera

It is used for measurement of temperature of surfaces which can generate heat. It is used by the NWRC in the pumping stations of Ministry of Water Resources and Irrigation.

9. Construction Works' Instruments

9.1. Universal Machine

It is used for measurement of resistance of samples to compression and tension after generating a pressure on the samples by a controller. It is available at the NWRC.

9.2. Wide Width Tensile Testing Method

It is used for measurement of tensile load elongation characteristics, offset modulus, and breaking toughness by conducting a hydraulic pressure. It is available at the NWRC.

9.3. Accelerometers

It is used for measurement of proper accelerations of a body in its own instantaneous rest frame. It is available at the NWRC.

9.4. Shaking Table

It is used to test the response of structures, soils and rock slopes to verify their seismic performance, and accordingly, it can be used to simulate the earthquakes loads on structures. It is available at the NWRC.