





arkon flow systems

Pre-qualification Package

PRE-QUALIFICATION PACKAGE CONTENT

1. COMPANY PROFILE

Arkon is a manufacturer of electromagnetic flowmeters, offering a wide range of products for flow control and measurement, including ultrasonic level and open channel flowmeters and flow indicators.

The products are incorporated with smart customizable communication modules such as 3G/GPRS/GMS, SMS, Wi-Fi, TCP/IP, BLUETOOTH, M-Bus, USB, RS232, RS485.

Our products are used in over 20 countries with applications such as Water Treatment & Distribution, Waste Water Management, Irrigation, Mining & Chemical Industry as well as projects where efficiency and accuracy coupled with smart technology matters the most.

PRODUCT RANGE

Arkon offers a wide range of pulsed DC flow meters, such as the:

- MAGX2 – Innovative modular design
- MAGB2 – Upgraded battery powered
- MAGB1 – Battery powered
- MAGE1 – Economic flowmeter
- MAGS1 – Flowmeter model without transmitter
- Agrimag – Plastic low cost flowmeter for agricultural applications
- AgrimagP – Plastic flowmeter with power supply and output
- AgrimagP2 – Plastic flowmeter with power supply, 4-20 mA output, Modbus RTU and data-logger

Arkon offers following verification tools for MAGseries flowmeters:

- VeriMAG1 - stand-alone smart field testing instrument for MAGB1 flowmeters
- VeriMAG2 - stand-alone smart field testing instrument for MAGX2 flowmeters

Arkon offers also other equipments for flow and level measurement:

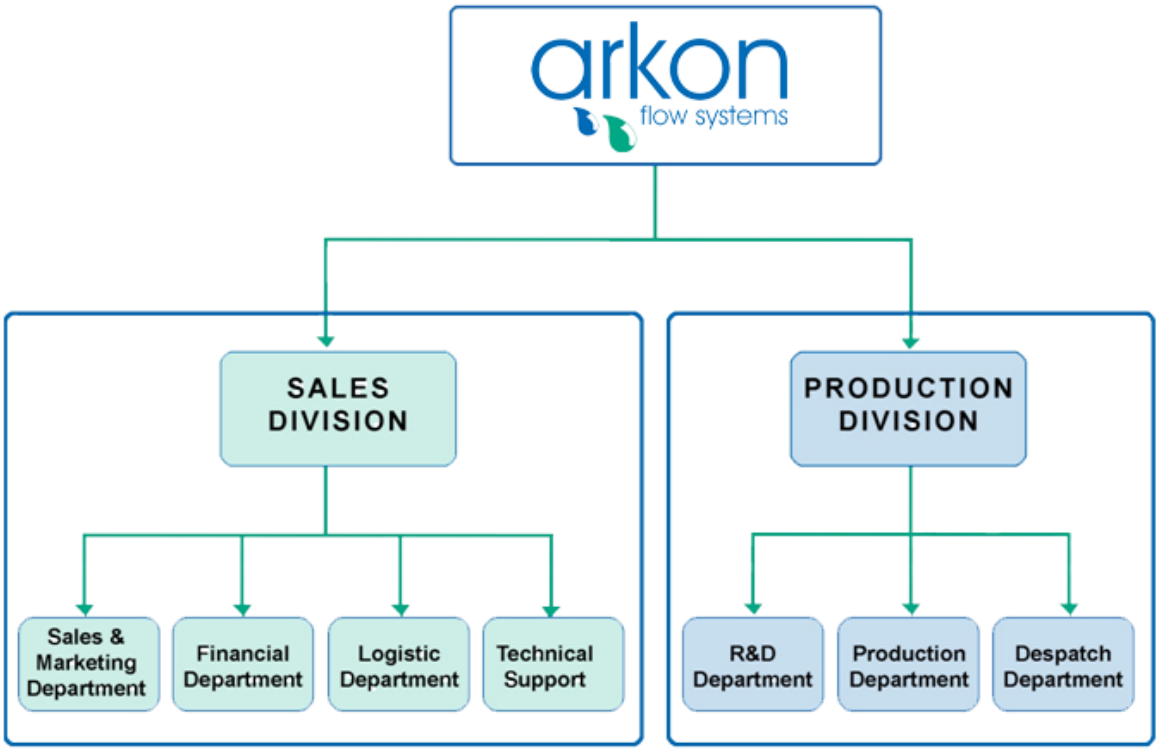
- Parshall Flumes
- Ultrasonic flowmeters and level meters
- Flow indicators
- Ultrasonic clamp-on flowmeters
- ARKON.TRACK
- RAVEN EYE – radar measuring system for open channels

OUR CUSTOMERS

Arkon offers their products to customers via worldwide distributors. Some of the countries where we have official distributors are:

- **EUROPE:** Finland, France, Greece, Portugal, Russia, Ukraine, United Kingdom.
- **NORTH AND SOUTH AMERICA:** Columbia, Chile, Mexico, Peru.
- **ASIA PACIFIC**: Australia, China, New Zealand, Philippines, Singapore, South Korea, Sri Lanka, Thailand, Vietnam.
- **MIDDLE EAST:** Bahrain, Egypt, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Turkey, United Arab Emirates.
- **AFRICA:** South Africa

2. COMPANY STRUCTURE



3. ARKON PRODUCT-RANGE

3.1. ELECTROMAGNETIC FLOWMETER

- **MAGX2**

The MAGX2 is an improved version of the successful Arkon MAGX1. It contir e philosophy of the modular design "Plug and Play". It is a flexible device for cu ll applications, from the most simple, where costs are very important, to the most demanding, requiring a high technical solution such as 3G/GPRS/GMS or TCP/IP communication. The transmitter consists of the low-cost basic unit plus optional modules according to the end-user's requirements. Each module is in fact a small electronic board of the size of a large postage stamp, which can be freely installed and removed from the main board in seconds. WRAS approved product for DN25, DN50 and DN80. WRAS approved material for sizes up to DN600.

MAGX2 is available also in MID and OIML version.

Outputs available	Communications available (all based on MODBUS)	Other options available
4-20 mA current output	RS232	Micro SD card for data-logging
Pulse output	RS485	3 options for remote mounting:
Pulse 230	USB	WALL, PANEL and DIN RAIL
	Bluetooth	External pressure sensor input
	TCP/IP	External temperature sensor input
	3G/GPRS/GMS	
	M-BUS	
	Wi-Fi	

- **MAGB2**

The MAGB2 has been specially developed for applications where the possibility of a power supply network is not available. MAGB2 battery-powered electromagnetic flowmeter is completely autonomous with advanced functionality. It is powered by lithium batteries placed inside the transmitter. Battery life is up to 10 years (5-pack). Its benefits are flexible installation, high-precision volume measurement, and worldwide transmission of measured data via Modbus RTU protocol. MAGB2 flowmeter is able to transmit data via internal 3G/GPRS/GSM communication module. Data can be sent to our arkon.track online monitoring system or any other server. WRAS approved material for sizes up to DN600.

Outputs Included	Output available	Inputs available	Communications available (all based on MODBUS)	Other options available
Pulse output with programmable volume function and pulse width	4-20 mA current output	External pressure sensor	USB	Data-logger
		External temperature sensor	3G/GPRS/GSM	

- **MAGB1**

The MAGB1 is the Arkon MID/OIML battery powered electromagnetic flowmeter. It is powered by lithium batteries placed inside the transmitter.

Climatic environment class	**B**
Electromagnetic class	E1 for compact, E2 for remote
Pressure class:	MAP10
Temperature class	T50
Pressure loss	ΔP 10
Accuracy class	2
Flow direction	Positive
Maximum permissible error for the lower flowrate zone /MPE1)	+/-5%
Maximum permissible error for the upper flowrate zone (MPE0)	+/- 2% for water having a temperature <30°C +/-3 % for water having a temperature > 30°C
Flow profile sensitivity classes	U5 D3
Orientation limitation	Any
Low flow cut off	1% from nominal flowrate
Max. cable length for remote version	6 m
Output options	2 options: Pulse output or RS485 communication

MAGE1

The MAGE1 is economic flowmeter with carbon steel sensor and plastic transmitter. It is mains powered flowmeter (9-35 VDC) with 4-20 mA output, RS485 communication and internal data-logger. Communication is done via USB using MODBUS RTU protocol. MAGE1 has +0.5% accuracy of actual value . WRAS approved material for sizes up to DN250.

- **MAGS1**

The MAGS1 is a stand-alone version of flowmeter, which does not need a transmitter and can be operated on its own. If you need a low cost flowmeter without read out on display and outputs, this will be the right one!!. Arkon offers its electromagnetic flowmeter MAGS1 for applications where flowmeter is connected to a PLC on RS485 MODBUS RTU protocol. That simple version is feed with 24VDC and has output/communication a standard RS485 line on MODBUS RTU protocol. WRAS approved material for sizes up to DN600.

- **Agrimag**

Agrimag is a user friendly low cost flowmeter. It is one piece built in polypropylene, powered by 6x AA batteries and available in DIN 25, 50, 80 mm (1", 2" and 3") sizes. Connections offered: Manifold clamping flanges compatible with fitting kits for DIN, BSP, NPT and other common connections. And it has and accuracy of 1% and a battery life of 1-3 years.

- **AgrimagP**

AgrimagP is plastic flowmeter with power supply and output for multiple applications. It is one piece built in polypropylene body, powered by external power supply. Available in DIN 25, 50, 80 mm sizes, connections offered – Manifold clamping flanges. Compatible with fittings kits for DIN, BSP, NPT and other common connections. Accuracy rating of 1% and one frequency output.

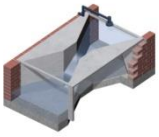
- **AgrimagP2**

AgrimagP2 is plastic flowmeter with power supply and most common outputs: 4-20mA and RS485. Compatible with fitting kits for DIN, BSP, NP T and other common connections. The communication is via RS485 Modbus RTU. Digital data-logger as standard (saves date, time and total volume).

- **VeriMAG1 and VeriMAG2**

VeriMAG is a stand-alone smart field testing instrument, which has the capability to test the integrity of an installed flowmeter, for functionality of the connection between the sensor and transmitter, and all important internal components of the device.

3.2. FLUMES



- **Parshall flumes**

Arkon Parshall flumes are primary flow devices with a wide range of applications, for measuring open channel flow. They can be used for flow measurement in creeks, irrigation and/or drainage channels, sewer outfalls, waste water treatment plants, etc.

Arkon Parshall flumes are made of polypropylene and are resistant to air temperatures up to 80°C (however, water inside the flume must not get frozen). Moreover, Arkon Parshall flumes can stand up well the solutions of inorganic salts, acids and bases that do not exhibit strong oxidation properties, and a majority of organic solvents. Maximum size of suspended solids is limited to 80% of the throat width (dmax = 0.8 w).

Arkon Flow Systems also provides checking of your hydraulic projects of Parshall flumes for free/at no cost, hydraulic calculation of Parshall flumes installations (via email) and (attached) electronic flowmeters with ultrasonic transducer on request.

3.3. ULTRASONIC FLOWMETERS

- **MHU ultrasonic level-meter**

The MHU is an ultrasonic level-meter. It is available for 3 measurement ranges; 2, 4 or 6 meter. A special version suitable for measurement with 2 sensors is also available. It offers RS232 or RS485 communication (with Modbus RTU as option). The transmitter includes a LCD display, 4 buttons, internal data-logger, temperature compensation and analogue and binary output.

- **MQU ultrasonic flow-meter**

The MQU is the Arkon ultrasonic flowmeter for open channels. It should be use in combination of a flume. It is available for measurement ranges from 0.5 to 4 meters. The transmitter includes a LCD display, 4 buttons, internal data-logger, communication RS232 or RS485 (with Modbus RTU as option), temperature compensation and analogue and binary output.. There is also available a version for measurement with 2 sensors instead of 1.

3.4. FLOW INDICATORS

- **Ball flow indicator**

Mechanical flow indicator for all liquids and gasses. The liquid enters the valve housing and lifts the ball from the valve seat placed in a glass dome. Manufactured in stainless steel or bronze, providing an excellent chemical compatibility, Arkon ball flow indicators are rated up-to-16-bar pressures and up-to-200-C temperatures. Available in sizes from 1/4" to 1 ½". Connections with BSP and NPT.

- **Spinner flow indicator**

The bright yellow spinner can be seen in the glass dome when there is flow. The Spinner flow indicator is a single sided indicator. The spinner starts to rotate when flow starts. The design offers low pressure losses and is suitable for installation in both horizontal and vertical pipework. Manufactured in gunmetal is rated up-to-10-bar pressures and up-to-100°C temperatures. Available in sizes from 15 to 40mm. Connections with BSP and NPT.

- **Paddle wheel flow indicators**

Manufactured in stainless steel or carbon steel as standard, Arkon paddle wheel flow indicators are rated up-to-60-bar pressures and up-to-250-C temperatures. Especially suitable for checking flow, presence, colour and condition of a liquid in full pipes, either horizontally or vertically installed, showing presence of condensate in steam return lines/pipes; ensuring cooling-water-flow maintenance to specialized medical equipment; or indicating chemical dosing on water treatment plants. Available in sizes from ½" to 8". Connections with BSP, NPT and ANSI150.

Flap flow indicator

Manufactured in stainless steel or carbon steel as standard, Arkon flapper sight flow indicators are rated up-to-60-bar pressures and up-to-250-C temperatures. Especially suitable for full bore flows, either horizontal or vertically-upward. Ideal as a plant safety device where it is required to maintain a constant flow, such as lubricating or cooling systems. Available in sizes from ½" to 4" (6" and 8" on request). With connections BSP, NPT and ANSI150.

- Plain flow indicator

The Plain Sight flow indicator is ideally suitable for visual checks on flow, presence, colour and condition of a liquid, where there is intermittent flow, partially filled pipes or entrained air, thanks to a plain spout cast in the body. Ideal for leak detection thanks to the integral drip lip. Manufactured in stainless steel or carbon steel as standard, Arkon plain sight flow indicators are rated up-to-60-bar pressures and up-to-250-C temperatures. Available in sizes from ½" to 8". Connections: BSP, NPT and ANSI150.

- **Tube Flow Indicator**

The tube indicator allows a 360° visual indication of the flow and contents in the pipes. It has a plain straight through borosilicate glass tube with stainless steel flanged ends and is used to check for the presence of a liquid where there is intermittent flow, partially filled lines or entrained air. Manufactured in stainless steel is rated up-to-10-bar pressures and up-to-150°C temperatures. Available in sizes from 15 to 20mm. Connections with ANSI150.

- **Window indicator**

Circular sight glass, for bolting or welding to tanks, vessels or pipes to allow viewing of the contents. This model is designed to provide a window for viewing the contents of a vessel or tank. Normally these are welded to the tank, but can be supplied suitable for bolting to a vessel or a pipe flange if required. Manufactured in carbon steel and stainless steel is rated up-to-40-bar pressures and up-to-250°C temperatures. Available in sizes from 40 to 200mm.

3.5. ULTRASONIC CLAMP-ON FLOWMETERS

- **USCX100**

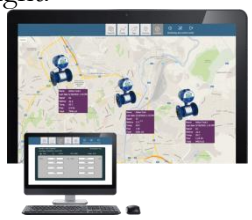
The USCX100 is a compact clamp-on ultrasonic flow transmitter with a robust and practical design for permanent installation and flow measurement on single pipes. The instument offers a cost-effective option owing to its simplified specification and availability of a range of transducer types.

- **USCX150**

The USCX150 is premiere product for flexibility and performance, providing the user with a comprehensive specification and a list of configuration options. The practical modular design and the wide variety of different transducer types available ensure this instrument is suitable from simple water flow measurement to energy flow monitoring.

- **USCX200**

The USCX200 is a fully portable instrument with a power which is belied by its small size. This lightweight flowmeter is incredibly easy to use and can be operated one-handed which makes it an ideal tool for use in confined spaces or when working at height.



3.6. ARKON.TRACK

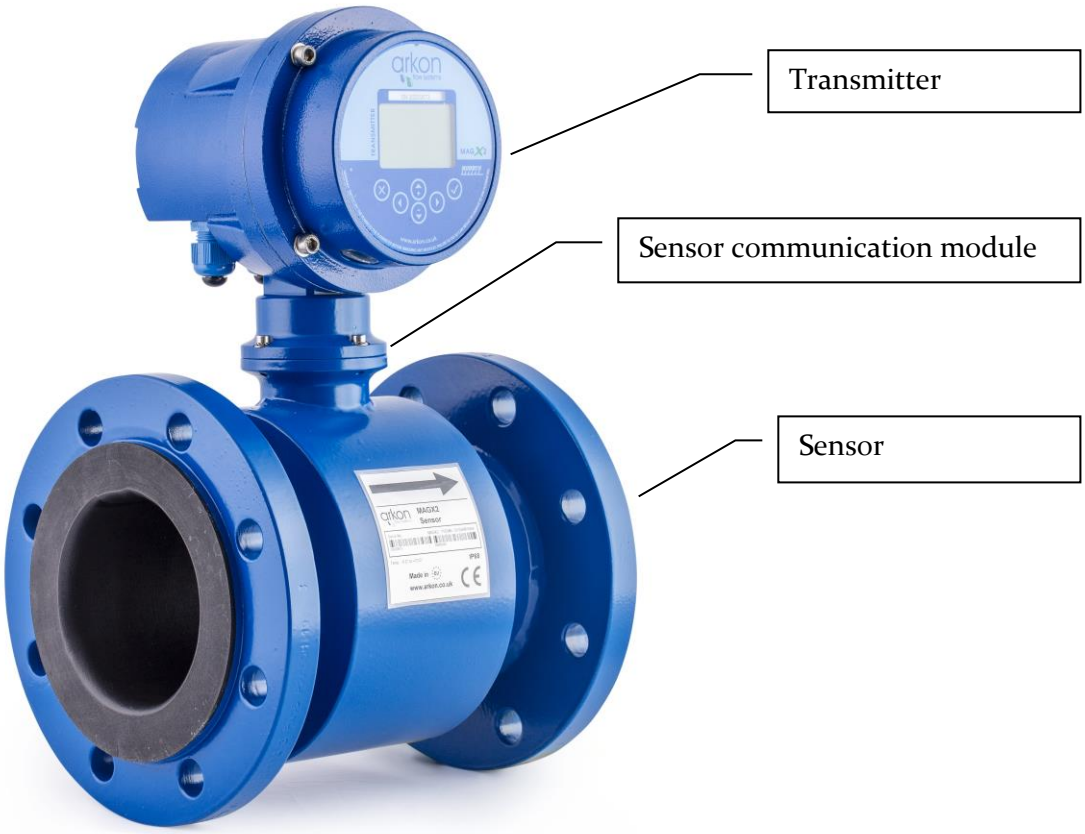
ARKON.TRACK telemetry systems are used by companies in every sector of business around the world including water companies, environmental regulators such as the Environment Agency, manufacturing and process companies and governmental organizations. Systems are truly unique and allow any user to install a monitoring station anywhere in the world regard less of any constraints over power, signal or even planning issues. The loggers are available in battery powered, D.C powered and A.C powered u nits. The only requirement is a GSM/GPRS coverage in order to remotely transmit data to remote servers, the logger which connect with the main data collection center with Dynamic IP so there is no need to purchase individual Static IP data packages for the data loggers, which is very expensive in most countries.

3.7. RAVEN EYE

The Raven-Eye is the new non-contact RADAR area/velocity flow meter for open channel flow measurements. It combines state of the art non-contact measuring technology which measures flow from above the water surface with easy integration into existing SCADA or telemetry systems.

4. MODULES

4.1. MAGX2 Configuration



Currently, the following optional modules are available:

RS485 RS232 USB 3G/GPRS/GSM WI-FI Bluetooth TCP/IP M-Bus

- Arkon offers 4-20 mA output and two pulse outputs.
Both options can be used separately or combined. Out of the two pulse options only one pulse option could be used or installed at any given time.

Current output 4-20mA | Pulse output | Pulse 230

- Data-logging option
MAGX2 motherboard includes a real time clock. For data-logging you just need a standard micro SD memory card. We can supply it for you or you can buy it yourself locally.

The most important advantage of Arkon's modular system is the flexibility for the customer to design his own solution for each application. Modular system also allows big savings by selecting and paying exactly for the required features on each application.

The MAGX2 flowmeter can be upgraded easily at any time by adding or exchanging modules.

4.2. MAGX2 Power supply Version 5

APPLICATIONS:

Industrial Power Supplies 90-250 V AC

12-36 V DC Distributed Power Systems.

This module is necessary for the complete flowmeter.

PIN LOCATION

Electrical Specifications

Input Voltages ±5% / max power / possible current consumption	AC 90 - 250V (50-60 Hz) / max. 15 VA / max 170 mA DC 12 – 36V / max 15W / max 1,25 A
External battery backup:	DC 12 – 36V / max 15W* The power supply is not charging the backup battery
Output Voltages	**3.3V / 2A** **23.6V/500mA**
Temp. Range	-20 – 70 °C
Dimensions:	R = 50mm H(230V) = 58mm H(12,24V) = 58mm
Weight	300g

	The device does not have a network power switch. For any electrical work or housing open it is necessary to disconnect the device from the network power, and this has to be done via a switch. The mains protective earth wire has to be connected to the PE terminal (power supply class 1). A switch or circuit breaker (B6) has to be in the building installation if mains supply 90 – 250 V AC from building installation is connected to the power supply module. It must be in close proximity to the equipment and within easy reach of the operator, and it shall be marked as the disconnecting device for the flowmeter.

90-250 V AC / 15VA Recommended power supply cable minimum 3xØ1mm^2	12 – 36 V DC / 15W Recommended power supply cable minimum 2xØ0.5mm^2	Backup power 12 – 36 V DC / 15W *If using backup battery, its voltage needs to be lower than usually used DC power supply or less than 24V in case of using AC power source See P32 - Backup battery procedure
All used wires have to be round crosscut cables.		

	Any connection or disconnection of any module has to be done with the network power to the meter switched off. The flowmeter is CAT II – CAT III device.

4.3. MAGX2 4-20 mA Current Loop output

Analogue output modules

4-20mA Current Loop output — Module Datasheet

Specifications	
Name:	Current Loop
Dimensions:	3,3 x 2,6 x 1,7 cm
Weight:	22g
Accesories included:	1pc of three pin terminal

Electrical specifications	
12-bit DAC	
Maximum Resolution	3,9 µA
VCC to Ground:	3,3V DC
Current out:	4-20 mA
Output mode:	Active or Pasive
Temp. Range:	From -20 to +70ºC

Functions & features

Used for most of PLCs.

Applications

Industrial automation, industrial process control, test systems, smart transmitters

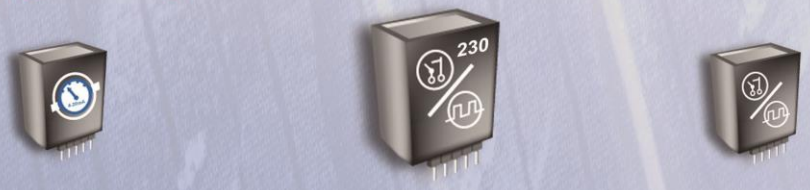
Pictures

How to use the module

4.4. MAGX2 PULSE output

4.5. MAGX2 Pulse 230

Analogue output modules



Pulse 230

Module Datasheet

Specifications	
Name:	Pulse 230
Dimensions:	3,9 x 2,9 x 3,3 cm
Weight:	26g
Accesories included:	4pcs of two terminal connector
Electrical specifications	
VCC to ground:	3,3V DC
Output mode:	Frequency, Pulse Relay and open collector
Max. Relay power (RE2, RE3):	250V AC/220 DC at 120VA/60W
Output frequency:	2-1000 Hz
Max. Input voltage (batching):	+5 - 14V DC
Temperature range:	From -20°C to +70°C

Functions & features

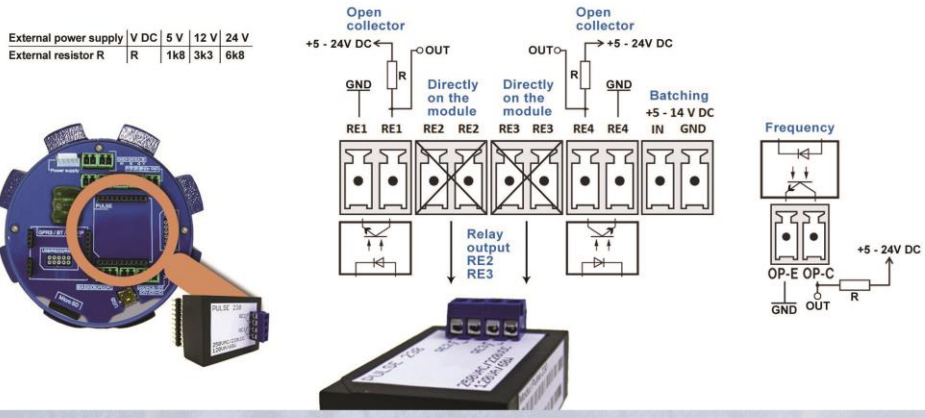
Two dry contact relays, two open collectors, batch input and frequency output

Applications

Industrial automation, industrial process control, test systems

Pictures

How to use the module



4.6. MAGX2 RS232 Communication module

4.7. MAGX2 RS485 Communication module

Digital communication modules

RS485 Communication module

Module Datasheet

Specifications

Name:	RS485
Dimensions:	3,3 x 2,6 x 1,7 cm
Weight:	22g
Accesories included:	1pc of three pin terminal connector included

Electrical specifications

VCC to Ground:	3,3V DC
Baud rate:	Max. 115200 baud/s

Functions & features

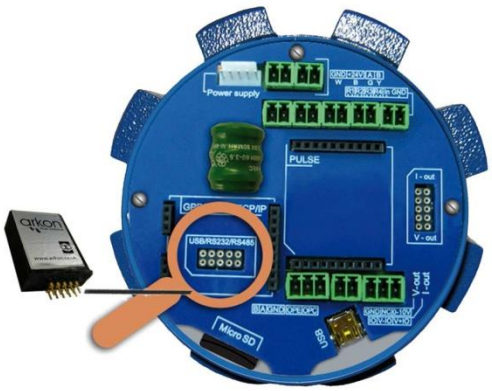
Connection for connecting PLCs and SCADA systems

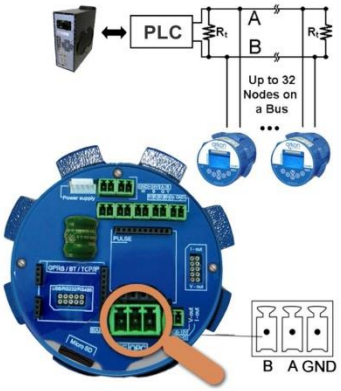
Applications

Industrial automation, industrial process control, PC and PLCs

Pictures

How to use the module





Multi-Node Network with End Termination Using RS485
Terminator R, with resistance 100Ω should be connect to the end of line RS485.

4.8. MAGX2 USB Communication module

4.9. MAGX2 Bluetooth Communication module

Digital communication modules

Bluetooth Communication module Module Datasheet

Specifications	
Name:	Bluetooth
Dimensions:	3,3 x 2,3 x 1,4 cm
Weight:	7g
Accesories included:	Antenna and cable

Electrical specifications	
VCC to Ground:	3,3V DC
Power Sup. Current:	120 mA
Baud Rate:	Max. 460.8 kbaud/s
Carrier Frequency:	2,402 - 2,480 GHz
Range:	100m (class 1)
Temp. Range:	From -20 to +70ºC

Functions & features

Easy wireless connection for short distances

Pictures

Applications

Wireless control of and communication between transmitter and PC or PLC systems. Any system requering Bluetooth communications

How to use the module

There is a condition that must be fulfilled for the Bluetooth module to be able to operate correctly: line speed of the communication protocol MODBUS must be set up on 19200Bd, Parity none, 1 stop bit. If there is a different setting the communication will not work.

4.10. MAGX2 TCP/IP Communication module

Digital communication modules

TCP/IP Communication module — Module Datasheet

Specifications	
Name:	TCP/IP
Dimensions:	3,4 x 3,2 x 2,4 cm
Weight:	11g
Accesories included:	None

Electrical specifications	
VCC to Ground:	3,14V to 3,46V
Power Sup. Current:	120 - 267mA
Ethernet:	10/100Mbit
Temp. Range:	From -20 to +70 ºC

Functions & features

Easy remote control through company network or through internet.

Applications

Industrial Automation, Industrial process control, PC and PLCs.

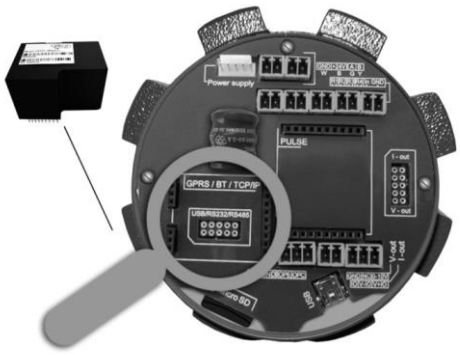
Pictures

How to use the module

There is a condition that must be fulfilled for the TCP/IP module to be able to operate correctly: line speed of the communication protocol MODBUS must be set up on 19200Bd, Parity none, 1 stop bit. If there is a different setting the communication will not work.

4.11. MAGX2 3G/GPRS/GSM Communication module

APPLICATIONS:	
Wireless monitoring of the flowmeter via SMS messages and/or 3G/GPRS data transfer, Wireless data collection systems, SCADA, Arkon.Track	
Electrical Specifications	
VCC to Ground	3.3 VDC
Power Supply Current	RMS 400mA, MAX 1500mA
Operating Systems	GSM 850 / GSM 900 DCS 1800 / PCS 1900 3G
Multi-slot class	10 (4 Rx / 2 Tx / 5 Sum)
SIM Card	3.0 / 1.8 V
Temp. Range	–20 – 70 °C
BASIC CIRCUIT CONNECTIONS:	



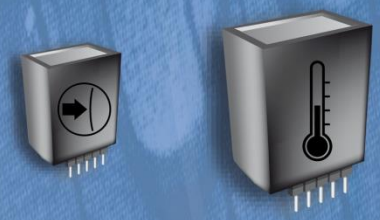
See3G/GPRS/SMS Module Installation manual.

4.12. MAGX2 Wi-Fi Communication module

4.13. MAGX2 External pressure sensor

4.14. MAGX2 External temperature sensor

External sensors



ET External temperature sensor — Module Datasheet

Specifications

Name:	External temperature sensor
Dimensions:	3,9 x 2,9 x 3,3 cm
Weight:	26 g
Accesories included:	6pcs of two pin terminal conn.

Electrical specifications

VCC to Ground:	3,3V DC
RTD Sensor Type:	Pt100, Pt200, Pt500, Pt1000
Tolerance RTD Sensors:	Class A, Class B
RTD Sensor connection:	2-wire, 3-wire, 4-wire
Measurement Range:	-30 – 180 °C
Temp. Range:	-20 – 70 °C

Functions & features

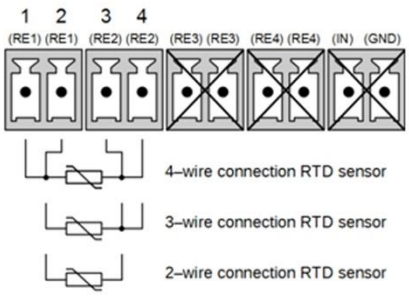
Supplement measurement of additional parameter - temperature.

Pictures

Applications

Industrial Automation, Industrial Process Control, Test Systems, Smart Transmitter

How to use the module



5. REFERENCE LIST

EUROPE		
Bulgaria	EVN Bulgaria Heating EAD	Heating
Estonia	Kivioli Keemiatoostuse OU	Chemical Industry
Estonia	Schottli Keskkonnatehnika AS	Water Treatment
Estonia	ECCUA OU	Water Treatment
Estonia	Loo Vesi AS	Wastewater Treatment
Estonia	Viru Keemia Grupp AS	Energy production
Estonia	KE INFRA	Energy production
Estonia	AS Fortum Tartu	Energy production
Estonia	Viimsi Vesi AS	Water treatent
Estonia	Adven Eesti AS	Food industry
Estonia	VKG OIL AS	Chemical Industy
Estonia	Filter AS	Heat Energy Production
Finland	Lahti Energia	Power plant
Finland	VTT	Pulp&Paper
France	FPP	Fire security
France	SICOMETAL S.A.	Construction
France	INGREDIA	Food industry
France	SIG	Energy management
France	PRECIA MOLEN	Industrial products
Germany	Ascotec	Steel plant
Greece	Aiolikos S.A	Treated sewerage outflow
Greece	Athens Metro	Metro
Greece	Drinks Romanos	Integrated tourist development area
Greece	Elounda Delux Resort	Hotel Resort
Greece	Halkor S.A	Metal Processing Company
Greece	Chitos SA	Water bottling
Greece	Olympic Brewery S.A	Alcoholic beverages
Greece	Olympic Properties S.A	Irrigation
Greece	Titan Cement Co S.A	Cement company
Greece	Cosmote	Telecomunications
Greece	Unifarma	Pharmaceuticals
Greece	DIAS	Pisciculture
Greece	ANDROMEDA S.A.	Aquatic organisms crops
Greece	IPPODAMOS SA	Irrigation Network
Greece	DAFOULIS-IATRAKIS-TSAMPOS	Biological Cleaning Installation
Hungary	Bakonytruck Ltd.	Fuel industry
Hungary	Naszálytej Ltd.	Milk industy
Hungary	PureAqua Ltd.	Sewage treatment
Hungary	Hungarian Public Road Nonprofit Pte Ltd Co.	Measuring of solution for defrosting
Ireland	Diageo GBN	Alcoholic beverages
Ireland	Norbrook Labs	Wastewater treatment

For more references please follow our website www.arkon.co.uk.

6. CERTIFICATES

6.1. ISO 9001 Certificate (available only as an electronic version or prepaid original):

BUREAU VERITAS Certification

Certificate

Awarded to

Arkon Flow Systems, s.r.o.

Registered address: Berkova 534/92, 612 00 Brno – Královo pole
Site: Nováčkova 11, 614 00 Brno
Czech Republic

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standard detailed below:

Standard

ISO 9001:2015

Scope of certification
(The scope of supply is valid only for site)

DESIGN, DEVELOPMENT, PRODUCTION, SUPPLYING AND SERVICES OF FLOWMETERS AND MEASURING INSTRUMENTS INCLUDING APPLICATION SOFTWARE

Original cycle start date: 29th JUNE 2004
Expiry date of previous cycle: 20th JUNE 2019
Certification / Recertification Audit date: 10th JULY 2019
Certification / Recertification cycle start date: 17th JULY 2019

Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: 20th JUNE 2022

Certificate number: CZ008315-1

Version 1, Revision date: 17th JULY 2019

Signed on behalf of BVCH SAS UK Branch

BUREAU VERITAS Certification

UKAS MANAGEMENT SYSTEMS 0008

Certification body address: 5th Floor, 66 Prescot Street, London E1 8HG, United Kingdom
Local office: BUREAU VERITAS CZECH REPUBLIC, spol. s r.o., Olbrachtova 1, 140 02 Praha 4, Czech Republic

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation. To check this certificate validity please call: +420 210 088 215

6.2. P.E.D. Certification

Arkon Flow Systems

Pressure Engineering Directive (P. E. D.) Certificate

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with the name	Electromagnetic Flow Sensor
Types	MAGX2 MAGB1 MAGS1

are manufactured and conform to the Pressure Engineering Directive 97/23/EC.

Place: Brno, Czech Republic Date: 12.03.2014 For and on behalf of Arkon Flow Systems s.r.o

6.3. CERTIFICATES

6.3.1. Certificate of Conformity

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Electromagnetic Flowmeter and accessories
Type	MAGX2

Conforms to the following technical specification of the product

Safety requirements
EN 61010-1:2003

Electromagnetic compatibility
EN 61326-1:2006, 1:2007
EN 55011 ed. 2:2007 + A2:2007, group 1, class A
EN 61000-3-3 ed. 2:2009 (EN 61000-3-3:2008)

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Electromagnetic Flowmeter
Type	MAGB1

Conforms to the following technical specification of the product

Electromagnetic compatibility
EN 61326-2006 + rev.1:2007
EN 55011 ed. 2:2007 Group 1, Class A

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Electromagnetic flowmeter and accessories
Type	MAGS1

Conforms to the following technical specification of the product

EN 55011:2009
EN 61000-3-2:2006 + A1:2009 + A2:2009
EN 61000-3-3:2008
EN 61326-1:2006

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Electromagnetic flowmeter and accessories
Type	Agrimag, AgrimagP

Conforms to the following technical specification of the product

EN 55011:2009
EN 61326-1:2006

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Ultrasonic Flowmeter
Type	MQU

Conforms to the following technical specification of the product

ČSN EN 331500	
ČSN EN 50081-1; ČSN EN 50081-2	
ČSN EN 50022	
ČSN IEC 801-2; ČSN IEC 801-3; ČSN IEC 801-4	
GD 17/2003 Coll. of Validity wording	13/023/EEC
GD 18/2003 Coll. of validity wording	89/336/EEC
GD 464/2005 Coll. of validity wording	32004L 0022

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Ultrasonic Level meter
Type	MHU

Conforms to the following technical specification of the product

ČSN EN 331500	
ČSN EN 50081-1; ČSN EN 50081-2	
ČSN EN 50022	
ČSN IEC 801-2; ČSN IEC 801-3; ČSN IEC 801-4	
GD 17/2003 Coll. of Validity wording	13/023/EEC
GD 18/2003 Coll. of validity wording	89/336/EEC
GD 464/2005 Coll. of validity wording	32004L 0022

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Přízova 1-3, 602 00 Brno, Czech Republic

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Type	Ball Flow Indicators Flapper Indicators Plain Indicators Paddle Wheel Indicators

Conforms to the following technical specification of the product

The Sight Flow Indicators are for in line mounting within pipelines. They comprise of a flanged or screwed casting with glasses mounted such that the conditions within the pipeline can be visually examined. Flaps or spinners may be mounted within the unit to establish whether flow is taking place.

Units are rated for Hazard Category I and II, and are pressure tested to at least 1.5 times rated maximum working pressure.

Manufacture is covered by Module "A" and "D1" of the Pressure Equipment Regulations 1999.

TUV UK Limited of Surrey House, Surrey Street, Croydon, CR9 1XZ is the notified body who carried out the inspection and monitors the Manufacturers Quality Assurance System.

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

Certificate of Conformity

Arkon Flow Systems s.r.o., Přízova 1-3, 602 00 Brno, Czech Republic

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name Parshall Flumes

Conforms to the following technical specification of the product

Certification
- Measurement instrument type TCM 142/95-2075 from 1995, certificated by the Czech Metrology Institute
- Certification of water tightness DIN 4034
- Certification according to Czech law nr. 22/97 Sb. , which proves the conformity with mentioned law.

Place: Brno, Czech Republic Date: 12.3.2014 For and on behalf of Arkon Flow Systems s.r.o

6.3.2. Certificate of Origin:

Arkon Flow Systems

European Union

Certificate of Origin

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Electromagnetic Flowmeter
Type	MAGX2, MAGB1, MAGS1, Agrimag, AgrimagP
Declares that product with name	Flow indicators
Type	Ball flow indicator, Spinner flow indicator, Paddle wheel indicator, Plain sight flow indicator, Tube Flow indicator, Flap Flow indicator, Window indicator

Has been manufactured within the State of the European Union

Place: Brno, Czech Republic Date: 18.03.2014 For and on behalf of Arkon Flow Systems s.r.o

Arkon Flow Systems

European Union

Certificate of Origin

Arkon Flow Systems s.r.o., Nováčkova 11, 614 00 Brno, Czech Republic

Declares that product with name	Ultrasonic level/flowmeter
Type	MQU ultrasonic flowmeter MHU ultrasonic flowmeter
Declares that product with name	Parshall flumes
Type	Parshall flume P1, Parshall flume P2, Parshall flume P3, Parshall flume P4, Parshall flume P5, Parshall flume P6, Parshall flume P7, Parshall flume P8, Parshall flume P9

Has been manufactured within the State of the European Union

Place: Brno, Czech Republic Date: 18.03.2014 For and on behalf of Arkon Flow Systems s.r.o

6.3.3. Certificate of Calibration:

CERTIFICATE OF CALIBRATION

Page No.: 1/1

Calibration certificate No: S22212513

Meter:	Electromagnetic flowmeter
Manufacturer:	Arkon Production, s.r.o.
Customer:	Arkon Flow Systems, s.r.o.
Type:	MAGX2
Serial number:	22212513
DN:	80

Test conditions:
The primary head has been calibrated against a volumetric metod at authorized metrological centre.
The calibration certificate of this method documents the traceability to national standards, which realize the

Etalon used: YOKOGAWA AXF015G DN15
YOKOGAWA AXF015G DN80

Conductivity of the calibration water: 300 µS/cm
Test medium: clear water
Water temperature in test: (21 ± 0,5)C°
The calibration were carried out with an inlet and outlet section-lenght of 5-10D.

Results of the test:
The measured values were computer-processed into the following table:

Flow (m3/hr)	Error (%)	U (%)
25,00	-0,06	0,3
12,50	0,06	0,3
5,00	0,03	0,3

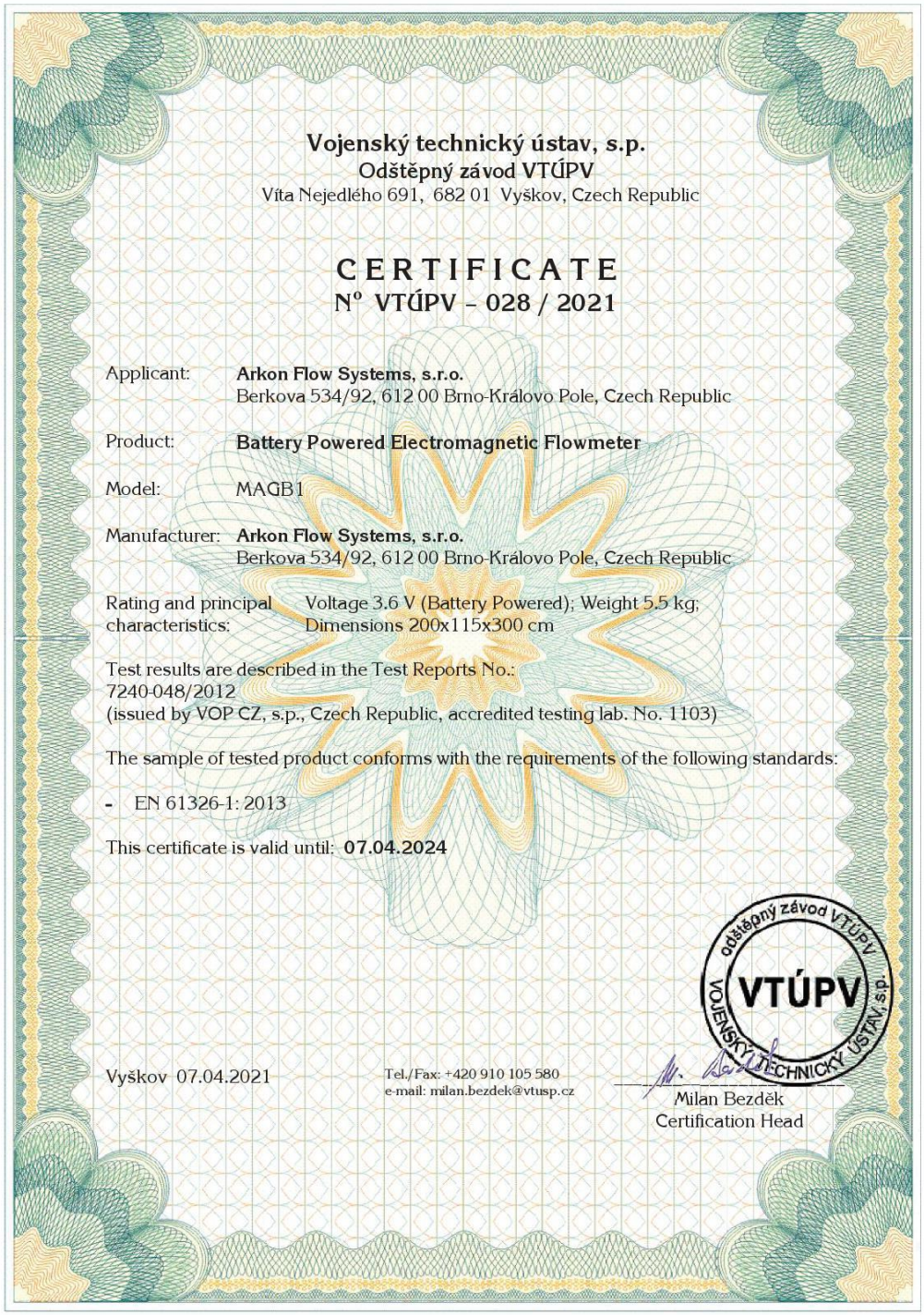
Date of calibration: 10.4.2012
Date of issue: 10.4.2012

Arkon Flow Systems, s.r.o.
Dušan Tichý

.....
Signature

Arkon Flow Systems, s.r.o.
Berkova 534/92, 602 00, Brno, Czech Republic, Email: office@arkon.co.uk
Web: www.arkon.co.uk

6.3.4. CE Certificates MAGB1



Vojenský technický ústav, s.p.
Odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE
Nº VTÚPV – 028 / 2021

Applicant: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Product: **Battery Powered Electromagnetic Flowmeter**

Model: MAGB1

Manufacturer: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Rating and principal characteristics: Voltage 3.6 V (Battery Powered); Weight 5.5 kg; Dimensions 200x115x300 cm

Test results are described in the Test Reports No.:
7240-048/2012
(issued by VOP CZ, s.p., Czech Republic, accredited testing lab. No. 1103)

The sample of tested product conforms with the requirements of the following standards:

- EN 61326-1: 2013

This certificate is valid until: **07.04.2024**

odštěpný závod VTÚPV VTÚPV VOJENSKÝ TECHNICKÝ ÚSTAV, s.p.

Vyškov 07.04.2021

Tel./Fax: +420 910 105 580
e-mail: milan.bezdek@vtusp.cz

Milan Bezděk
Certification Head

6.3.5. CE Certificate MAGX2

Vojenský technický ústav, s.p.
Odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE
N° VTÚPV – 010 / 2019

Applicant: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Product: **Electromagnetic Flowmeter**

Model: MAGX2

Manufacturer: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Rating and principal characteristics: Input Voltage: 90-250 V ; Frequency: 50-60 Hz;
Power Output: max. 15 VA

Test results are described in the Test Reports No.:
194300-606/2015, 194300-607/2015, 194300-612/2015, 194400-133/2015
(issued by VTÚPV, Equipment Testing Section)

The sample of tested product conforms with the requirements of the following standards:

- EN 55011: 2009+A1: 2010, Group 1, Class B
- EN 61000-3-2: 2014
- EN 61000-3-3: 2013
- EN 61010-1: 2010
- EN 61326-1: 2013, Chapter 6, Table 2

This certificate is valid until: **12.02.2022**

odštěpný závod VTÚPV VTÚPV VOJENSKÝ TECHNICKÝ ÚSTAV

Vyškov 12.02.2019

Tel./Fax: +420 910 105 517
e-mail: milan.bezdek@vtusp.cz

Milan Bezděk
Certification Head

6.3.6. CE Certificate MAGS1

Vojenský technický ústav, s.p.
Odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE
N° VTÚPV – 027 / 2021

Applicant: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Product: **Electromagnetic Flowmeter**

Model: MAGS1

Manufacturer: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Rating and principal characteristics: Voltage 230 V AC; Phase Current 100 mA; Weight 17 kg; Dimensions 250x220x375 cm

Test results are described in the Test Reports No.:
7240-037/2012, 7240-060/2012, 7240-061/2012
(issued by VOP CZ, s.p., Czech Republic, accredited testing lab. No. 1103)

The sample of tested product conforms with the requirements of the following standards:

- EN 55011: 2009
- EN 61000-3-2: 2014
- EN 61000-3-3: 2013
- EN 61326-1: 2013

This certificate is valid until: **07.04.2024**

odštěpný závod VTÚPV VTÚPV VOJENSKÝ TECHNICKÝ ÚSTAV, s.p.

Vyškov 07.04.2021

Tel./Fax: +420 910 105 580
e-mail: milan.bezdek@vtusp.cz

Milan Bezděk
Certification Head

6.3.7. CE Certificate Agrimag

Vojenský technický ústav, s.p.
Odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE
N° VTÚPV – 029 / 2021

Applicant: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Product: **Battery Powered Electromagnetic Flowmeter**

Model: Agrimag

Manufacturer: **Arkon Flow Systems, s.r.o.**
Berkova 534/92, 612 00 Brno-Královo Pole, Czech Republic

Rating and principal characteristics: Voltage 9 V (6xAA Battery Powered); Weight 2 kg; Dimensions 190x130x190 cm

Test results are described in the Test Reports No.:
7240-038/2012, 7240-044/2012
(issued by VOP CZ, s.p., Czech Republic, accredited testing lab. No. 1103)

The sample of tested product conforms with the requirements of the following standards:

- EN 55011: 2009
- EN 61326-1: 2013

This certificate is valid until: **07.04.2024**

odštěpný závod VTÚPV VOJENSKÝ TECHNICKÝ ÚSTAV s.p. VTÚPV

Vyškov 07.04.2021

Tel./Fax: +420 910 105 580
e-mail: milan.bezdek@vtusp.cz

Milan Bezděk
Certification Head

6.3.8. Material approval certificate – MWH KHONJI

MWH KHONJI

MATERIAL APPROVAL CERTIFICATE

cellmec SIMPLY DEPENDABLE

PROJECT NO.	SES-11-80-007
PROJECT TITLE	REHABILITATION & UPGRADING OF SELECTIVE PUMPING / LIFT STATIONS IN E, F & B NETWORKS
CONSULTANT	MWH KHONJI
CONTRACTOR	
MAC NO	EFB – 013R3

1	MATERIAL	DN 400 FLOW METERS MAGX2
2	MANUFACTURER	ARKON FLOW SYSTEMS - CZECH REPUBLIC
3	LOCAL SUPPLIER / OVERSEAS SUPPLIER	
4	LOCATION OF USE	E2 & E3 PUMPING STATIONS
5	SPECIFICATION CLAUSE / DRAWING NO.	B 4.4.4
6	TECHNICAL DETAILS	AS PER SPECIFICATION B 4.4.4
7	ESTIMATED DELIVERY PERIOD	
8	ESTIMATED DATE REQUIRED AT SITE	
9	ENCLOSURES SAMPLES / CATALOGUES / TEST RESULTS	DATA SHEETS / COMLPLIANCE WITH SPEC. / CATALOGUES

CONTRACTOR'S SIGNATURE : HASSAN ABDULLA	DATE ISSUED : ~~04/12/2016~~ 12/12/16	DATE RECEIVED: 4/12/16 12/12/16

COMMENTS Approved DN400 MAG X2 ARKON FLOW METER SUBJECT TO L686
① SUBMIT CALIBRATION CERTIFICATE OF EACH FLOW METER AS COMPLIED BY THE MANUFACTURER IN THE CONTRACT MECHANICAL & ELECTRICAL WORK SPECIFICATION (SECTION II, B4.4.4.5) prior to dispatch.
② Spool pieces to be supplied for inserting into the mains in place of electromagnetic flow meter for maintenance purpose (Section II, B4.4.4.5, Mechanical & Electrical Work Specification)

MWH KHONJI Circulation 4 DEC 2016 No Reply Replied Copy for Files File No.:

APPROVAL STATUS

☐ APPROVED ☐ REJECTED ☑ APPROVED WITH COMMENTS (as above)

NOTE: This approval does not relieve the contractor of his contractual obligations under the contract.

CONSULTANT'S SIGNATURE	DATE RETURNED 13/12/2016

③ Proper installation & position of flowmeters to be as per the manufacturer requirements & need to be verified before installation of the flowmeter on the network.

6.3.9. OIML R49 MAGX2 Certification

Czech Metrology Institute

Member state
Czech Republic

OIML Certificate No.
R49/2013-CZ-16.04

OIML BASIC CERTIFICATE OF CONFORMITY

Issuing Authority

Name: Czech Metrology Institute
Address: Okružní 31,
638 00 Brno, CZ
Person responsible: Jan Kalandra

Applicant

Name: Arkon Flow Systems, s.r.o.
Address: Berkova 534/92, 612 00 Brno
Czech Republic

Manufacturer of the certified type
Name: Arkon Flow Systems, s.r.o.
Address: Berkova 534/92, 612 00 Brno
Czech Republic

Identification of the certified type

Water meter
Type: MAGX2

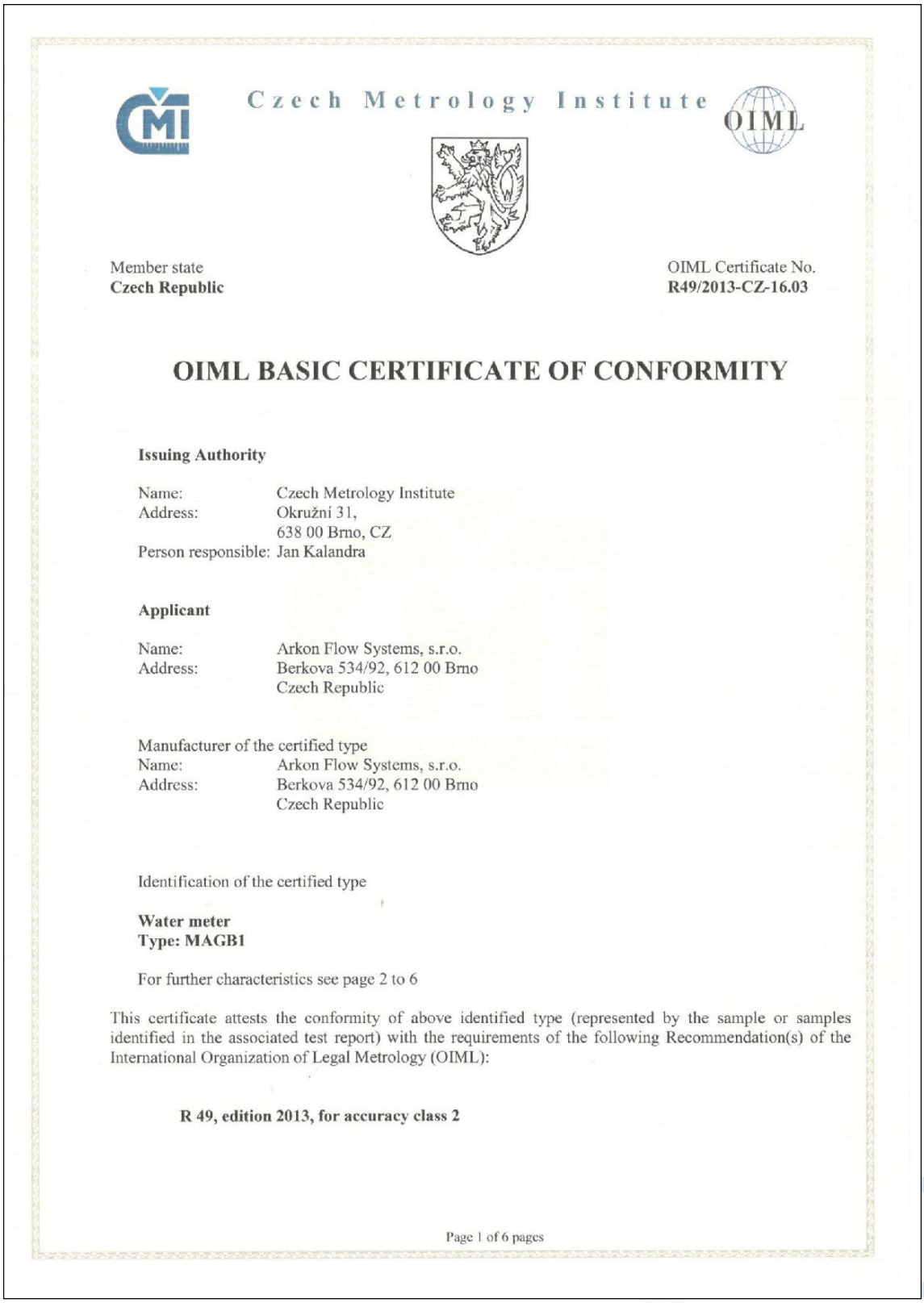
For further characteristics see page 2 to 7

This certificate attests the conformity of above identified type (represented by the sample or samples identified in the associated test report) with the requirements of the following Recommendation(s) of the International Organization of Legal Metrology (OIML):

R 49, edition 2013, for accuracy class 2

Page 1 of 7 pages

6.3.10. OIML R49 MAGB1 Certification



Czech Metrology Institute

Member state
Czech Republic

OIML Certificate No.
R49/2013-CZ-16.03

OIML BASIC CERTIFICATE OF CONFORMITY

Issuing Authority

Name: Czech Metrology Institute
Address: Okružní 31,
638 00 Brno, CZ
Person responsible: Jan Kalandra

Applicant

Name: Arkon Flow Systems, s.r.o.
Address: Berkova 534/92, 612 00 Brno
Czech Republic

Manufacturer of the certified type
Name: Arkon Flow Systems, s.r.o.
Address: Berkova 534/92, 612 00 Brno
Czech Republic

Identification of the certified type

Water meter
Type: MAGB1

For further characteristics see page 2 to 6

This certificate attests the conformity of above identified type (represented by the sample or samples identified in the associated test report) with the requirements of the following Recommendation(s) of the International Organization of Legal Metrology (OIML):

R 49, edition 2013, for accuracy class 2

Page 1 of 6 pages

6.3.11. IP68 Certificate MAGX2

Strojírenský zkušební ústav, s.p. (Engineering Test Institute, Public Enterprise),
Hudcova 424/56b, 621 00 Brno, Czech Republic

CERTIFICATE

B-32-00337-16

Manufacturer:	Arkon Flow Systems, s.r.o. Berkova 534/92, 612 00 Brno - Královo Pole Czech Republic
Company ID No.:	27683826
Products:	Electromagnetic flowmeters
Type designation:	MAGX2
Versions:	Compact, Remote

The Engineering Test Institute, Public Enterprise, hereby certifies that the characteristics of the sample of the products concerned have been found conforming to the applicable requirements

for the IP 68 protection rating as per ČSN EN 60529:1993 (at a water level of 1.25 m above the top edge of the sample for the duration of 15 hours).

This Certificate has been issued based on Final Report 32-0261 of 2016-03-23, issued by the Engineering Test Institute, Public Enterprise.

The rules for using the Certificate are specified on Page 2.

Brno, 2016-03-23

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

Ing. Tomáš Hruška
Director

B-32-00337-16, page 1 (2)

Strojírenský zkušební ústav, s.p., Hudcova 56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 56b, 621 00 Brno, Czech Republic
www.szutest.cz

6.3.12. IP68 Certificate MAGB1

Strojírenský zkušební ústav, s.p. (Engineering Test Institute, Public Enterprise),
Hudcova 424/56b, 621 00 Brno, Czech Republic

CERTIFICATE

B-32-00336-16

Manufacturer:	Arkon Flow Systems, s.r.o. Berkova 534/92, 612 00 Brno - Královo Pole Czech Republic
Company ID No.:	27683826
Products:	Electromagnetic flowmeters
Type designation:	MAGB1
Versions:	Compact, Remote

The Engineering Test Institute, Public Enterprise, hereby certifies that the characteristics of the sample of the products concerned have been found conforming to the applicable requirements

for the IP 68 protection rating as per ČSN EN 60529:1993 (at a water level of 1.25 m above the top edge of the sample for the duration of 15 hours).

This Certificate has been issued based on Final Report 32-0261 of 2016-03-23, issued by the Engineering Test Institute, Public Enterprise.

The rules for using the Certificate are specified on Page 2.

Brno, 2016-03-23

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. EZ 1

Ing. Tomáš Hruška
Director

B-32-00336-16, page 1 (2)

Strojírenský zkušební ústav, s.p., Hudcova 56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 56b, 621 00 Brno, Czech Republic
www.szutest.cz

6.3.13. MAGB1 MID Certificate – TCM 142/17 - 5478

Czech Metrology Institute
Notified Body No. 1383
Okružní 31, 638 00 Brno, Czech Republic
tel. +420 545 555 111, fax +420 545 222 728
www.cmi.cz
V 3112

EU-TYPE EXAMINATION CERTIFICATE

Number: TCM 142/17 - 5478

In accordance:	with Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (implemented in Czech Republic by Government Order No. 120/2016 Coll.).
Manufacturer:	Arkon Flow Systems, s.r.o. Berkova 534/92 612 00 Brno Czech Republic
For:	water meter – inductive Type: MAGB1 Accuracy class: 2 Temperature class: T50
Valid until:	27 June 2027
Document No:	0511-CS-A023-17
Description:	Essential characteristics, approved conditions and special conditions, if any, are described in this certificate.
Date of issue:	28 June 2017

Certificate approved by:

Český metrologický institut
-3-

RNDr. Pavel Klenovský

This certificate was issued according to module B of the Directive 2014/32/EU of the European Parliament and of the Council (implemented in CR by Government Order No. 120/2016 Coll.)

V 17-001

1. Characteristics of instrument:

The inductive water meters type MAGB1 are designed to measure, memorise and display the volume at metering conditions of water passing through the measurement transducer in the sense of the Directive 2014/32/EU of the European Parliament and of the Council of the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (implemented in Czech Republic by Government Order No. 120/2016 Coll.), as amended.
The water meters type MAGB1 are the electromagnetic water meters. There are two modifications: compact and remote version.
The water meters type MAGB1 consist of flow sensor and an electronic calculating/indicating device. The flow sensor measure based on an induction principle with PTFE and hard rubber lining, with straight inlet (5 times the diameter) and outlet (3 times the diameter) length, without flow conditioner. The maximum cable length for remote version is 10 meters. The meter is not designed to measure reverse flow. The meter does not require any extra-mechanical housing or adjustments.
The water meters type MAGB1 are equipped with the electronic indicating device. The display shows the measurements in cubic meter volume (positive, negative, total and auxiliary) and cubic meter per hour flow rate. The display is a digital type that can show up to 9 digits in two lines, and is equipped by 1 button. The normal resolution mode is used during normal operation. The water meter displays in the normal resolution mode up to 000000.001 m^3/h flow rate and 000.001 m^3 volume on the digital display. The water meter displays the volume resolution of 0.001 L on the digital display in the high resolution mode which would be used during the calibration process. This mode is set up by factory tool (software has to be attached) where the passwords (user, service and factory) secure access to the metrological parameters. Version of software is shown after reset system in last row right and on label. Checksum can be displayed by switching button.
The water meters type MAGB1 shall be installed to operate in arbitrary positions with the flow axis in the horizontal and vertical (from bottom to top and from top to bottom) plane and with the indicating device positioned at the top and at the side.
The water meters type MAGB1 can be equipped by frequency output which can be used for remote reading or by RS 485 (with maximum cable length 3 m).

2. Main characteristics:

Basic technical data of water meters type MAGB1 DN25 to DN40:

Nominal diameter(DN)[mm]	25			32			40		
Overload flowrate(Q_4)[m^3/h]	20			31.3			50		
Permanent flowrate(Q_3)[m^3/h]	16			25			40		
Transitional flowrate(Q_2)[m^3/h]	0.16	0.26	0.51	0.25	0.40	0.80	0.40	0.64	1.28
Minimum flowrate(Q_1)[m^3/h]	0.10	0.16	0.32	0.16	0.25	0.50	0.25	0.40	0.80
Ratio Q_3/Q_1	160	100	50	160	100	50	160	100	50
Ratio Q_2/Q_1	1.6								
Ratio Q_4/Q_3	1.25								
Accuracy class	2								
Maximum permissible error for the lower flowrate zone (MPE_1)	±5%								
Maximum permissible error for the upper flowrate zone (MPE_4)	±2% for water having a temperature ≤ 30°C ±3% for water having a temperature > 30°C								
Temperature class:	T50								
Pressure-loss classes	Δp 10								
Indicating range[m^3]	99 999								
Resolution of the indicating device[m^3]	0.001 (normal mode) 0.000001 (calibration mode)								
Flow profile sensitivity classes	U5 D3								
Orientation limitation	any								
Length of horizontal water meter L [mm]	200								
Connection type-screw thread size	flange								
Climatic environment class:	B								
Electromagnetic environment class:	E1 (compact version)								

	E2 (remote version)
Software version	v10.34
Checksum	25668
Battery	3.6 V
Minimum battery life time:	5 years
Low flow cut off	1 % from nominal flowrate

Basic technical data of water meters type MAGB1 DN50 to DN80:

Nominal diameter(DN)[mm]	50			65			80		
Overload flowrate(Q_4)[m^3/h]	78.8			125			200		
Permanent flowrate(Q_3)[m^3/h]	63			100			160		
Transitional flowrate(Q_2)[m^3/h]	0.63	1.01	2.02	1.00	1.60	3.20	1.60	2.56	5.12
Minimum flowrate(Q_1)[m^3/h]	0.40	0.63	1.26	0.63	1.00	2.00	1.00	1.60	3.20
Ratio Q_3/Q_1	160	100	50	160	100	50	160	100	50
Ratio Q_2/Q_1	1.6								
Ratio Q_4/Q_3	1.25								
Accuracy class	2								
Maximum permissible error for the lower flowrate zone (MPE_1)	±5%								
Maximum permissible error for the upper flowrate zone (MPE_4)	±2% for water having a temperature ≤ 30°C ±3% for water having a temperature > 30°C								
Temperature class:	T50								
Water pressure class:	MAP 10								
Pressure-loss classes	Δp 10								
Indicating range[m^3]	99 999			999 999					
Resolution of the indicating device[m^3]	0.001 (normal mode) 0.000001 (calibration mode)								
Flow profile sensitivity classes	U5 D3								
Orientation limitation	any								
Length of horizontal water meter L [mm]	200								
Connection type-screw thread size	flange								
Climatic environment class:	B								
Electromagnetic environment class:	E1 (compact version) E2 (remote version)								
Software version	v10.34								
Checksum	25668								
Battery	3.6 V								
Minimum battery life time:	5 years								
Low flow cut off	1 % from nominal flowrate								

Basic technical data of water meters type MAGB1 DN100 to DN150:

Nominal diameter(DN)[mm]	100			125			150		
Overload flowrate(Q_4)[m^3/h]	312.5			500			788		
Permanent flowrate(Q_3)[m^3/h]	250			400			630		
Transitional flowrate(Q_2)[m^3/h]	2.50	4.00	8.00	4.00	6.40	12.80	6.30	10.08	20.16
Minimum flowrate(Q_1)[m^3/h]	1.56	2.50	5.00	2.50	4.00	8.00	3.94	6.30	12.60
Ratio Q_3/Q_1	160	100	50	160	100	50	160	100	50
Ratio Q_2/Q_1	1.6								
Ratio Q_4/Q_3	1.25								
Accuracy class	2								
Maximum permissible error for the lower flowrate zone (MPE_1)	±5%								
Maximum permissible error for the upper flowrate zone (MPE_4)	±2% for water having a temperature ≤ 30°C ±3% for water having a temperature > 30°C								

Temperature class:	T50		
Water pressure class:	MAP 10		
Pressure-loss classes	Δp 10		
Indicating range[m^3]	999 999		
Resolution of the indicating device[m^3]	0.001 (normal mode) 0.000001 (calibration mode)		
Flow profile sensitivity classes	U5 D3		
Orientation limitation	any		
Length of horizontal water meter L [mm]	250	250	300
Connection type-screw thread size	flange		
Climatic environment class:	B		
Electromagnetic environment class:	E1 (compact version) E2 (remote version)		
Software version	v10.34		
Checksum	25668		
Battery	3.6 V		
Minimum battery life time:	5 years		
Low flow cut off	1 % from nominal flowrate		

Basic technical data of water meters type MAGB1 DN200 to DN300:

Nominal diameter(DN)[mm]	200			250			300		
Overload flowrate(Q_4)[m^3/h]	787.5			1250			2000		
Permanent flowrate(Q_3)[m^3/h]	630			1000			1600		
Transitional flowrate(Q_2)[m^3/h]	6.30	10.08	20.16	10.00	16.00	32.00	16.00	25.60	51.20
Minimum flowrate(Q_1)[m^3/h]	3.94	6.30	12.60	6.25	10.00	20.00	10.00	16.00	32.00
Ratio Q_3/Q_1	160	100	50	160	100	50	160	100	50
Ratio Q_2/Q_1	1.6								
Ratio Q_4/Q_3	1.25								
Accuracy class	2								
Maximum permissible error for the lower flowrate zone (MPE_1)	±5%								
Maximum permissible error for the upper flowrate zone (MPE_4)	±2% for water having a temperature ≤ 30°C ±3% for water having a temperature > 30°C								
Temperature class:	T50								
Water pressure class:	MAP 10								
Pressure-loss classes	Δp 10								
Indicating range[m^3]	9 999 999								
Resolution of the indicating device[m^3]	0.001 (normal mode) 0.000001 (calibration mode)								
Flow profile sensitivity classes	U5 D3								
Orientation limitation	any								
Length of horizontal water meter L [mm]	350	400	500						
Connection type-screw thread size	flange								
Climatic environment class:	B								
Electromagnetic environment class:	E1 (compact version) E2 (remote version)								
Software version	v10.34								
Checksum	25668								
Battery	3.6 V								
Minimum battery life time:	5 years								
Low flow cut off	1 % from nominal flowrate								

3. Tests

Technical tests of the water meters type MAGB1 were performed in compliance with the International Recommendation OIML R 49 Edition 2013 (E) with conformity to ISO 4064, Test Reports No. 6015-PT-P0024-17, 6015-PT-P0050-17, 8553-PT-S1004-17, 8553-PT-S1012-17, 8551-PT-E0096-16 and 8551-PT-E0097-16.

4. Conformity marks and inscription:

The water meters type MAGB1 shall be clearly and indelibly marked with the following information:

- Water meter type
- Unit of measurement (m^3)
- Numerical value Q_3 in m^3/h ($Q_3 \times \times$) and the ratio Q_3 / Q_1 (R160 or R100 or R50)
- EU-type examination certificate number
- Manufacturer´s name, registered trade name or registered trade mark
- Post address of manufacturer
- Year of manufacture, two last digits of the year of manufacture, or the month and year of manufacture
- Serial number (as near as possible to the indicating device)
- Direction of flow, by means of an arrow (shown on both sides of the body or on one side only provided the direction of flow arrow is easily visible under all circumstances)
- Maximum admissible pressure (MAP 10)
- The temperature class (T50)
- The pressure loss class (Δp 10)
- The installation sensitivity class (U5 D3)
- Climatic and electromagnetic environmental classes (B; E1 or E2)
- The latest date that the battery is to be replaced
- Software version
- CE marking and metrology marking in line with the Directive 2014/32/EU

There are additional data required if the water meter is equipped with impulse output:
- Output signals for ancillary devices (type / levels)
- External power supply requirements (voltage – frequency)

These markings shall be visible without dismantling the water meter after the instrument has been placed on the market or put into use. Examples are in Figure 4.

5. Additional specifications:

The water meters type MAGB1 shall be put onto the market in line with the procedure of conformity assessment according to the Annex D or F of the Directive 2014/32/EU as well as in compliance with the technical description of this report and shall be tested in accordance with the requirements determined in ISO 4064-1:2014, respectively OIML R 49-1:2013.

A metrological test may only be performed by a producer, or a notified body respectively in line with the conformity assessment procedure by the D or F Annexes of the Directive 2014/32/EU, respectively.

6. Ensuring the integrity of the instruments:

The sealing is realized by passwords (user, service and factory) in case of factory tool and by putting seals on following places:
- screw on the cover plate inside the electronic (Figure 1);
- the screw covering the USB (Figure 2);
- reset jumper (Figure 3);
- the label to the body (Figure 4).

Alternatively sealing: the connection of both sides cover of the electronic have to be sealed by a safeguarding stickers (Figure 5) and the screw covering the USB (Figure 2).
The location and type of the seals are described in Figure 1 to Figure 5.

Connecting of the battery and the case of flow sensor and the frequency output and/or RS485 (Figure 6), if equipped, have to be secured by manufacturer´s installation seal or other relevant authority seal.

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7. Drawing of the instrument:
Water meters type MAGB1 are manufactured according to the technical documentation of manufacturer. Technical documentation contains following drawings:

Document reference	Date	Brief description
1000/01	11.2.2010	side rings
1028/06	21.1.2007	table of pipes
1030/03	8.2.2010	cover coil welded
1900/01	28.3.2010	MAGB1 sensor DN25
1900/02	28.3.2010	MAGB1 sensor DN32
1900/03	28.3.2010	MAGB1 sensor DN40
1900/04	28.3.2010	MAGB1 sensor DN50
1900/05	28.3.2010	MAGB1 sensor DN65
1900/06	28.3.2010	MAGB1 sensor DN80
1900/07	28.3.2010	MAGB1 sensor DN100
1900/08	28.3.2010	MAGB1 sensor DN125
1900/09	28.3.2010	MAGB1 sensor DN150
1900/10	28.3.2010	MAGB1 sensor DN200
1900/11	28.3.2010	MAGB1 sensor DN250
1900/12	28.3.2010	MAGB1 sensor DN300
3015/03	13.1.2010	housing DPS
3016/03	13.1.2010	housing DPS + printing
3018/02	7.1.2010	front glass printing
4000-1/01	1.12.2006	sensor
9006/01	2.3.2010	neck - welded
9006-2/01	2.3.2010	neck - tube
9006-1/01	20.3.2010	neck - flange
9006/02	2.3.2010	neck welded - complete
9007/02	1.12.2007	plastic cube
20000	-	table of coils
NH-10; rev. 1	9.7.2015	housing A
NH-11; rev. 1	9.7.2015	housing B
PCB_1012 (sheet 1-4)	28.1.2014	electronic scheme
SMT_Mount_MBB-COM_v5_1 MS_3003; issue 1 (no changes); 4 pages	-	electronic description
SMT_Mount_MBB_CPU_V5 MS_3004; issue 1 (no chnages); 2 pages	-	electronic description
PP-M - Sensor tube assembly; issue 1 (no revision); 22 pages	27.1.2014	assembly instructions
MAGB1_User_Guide_V1.8_ENG	16.11.2015	User Guide

History of additions

Addition No.	Description
Addition 0	Issuing certificate

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Figure 1: The water meter type MAGB1 – sealing of screw on the cover plate inside the electronic:

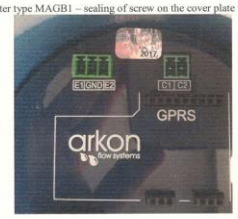

Figure 2: The water meter type MAGB1 – sealing of the screw covering the USB:

Figure 3: The water meter type MAGB1 – reset jumper:

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Figure 4: An example of the label and sealing:

Figure 5: The water meter type MAGB1 – alternatively sealing:

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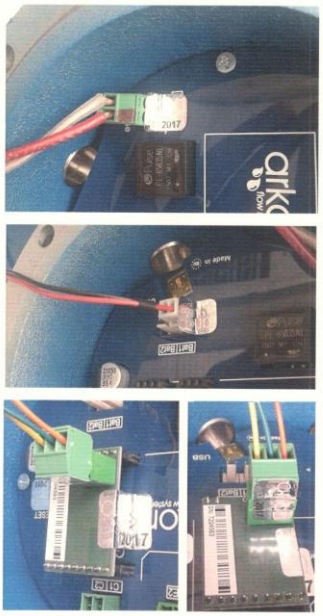
Figure 6: The water meter type MAGB1 – frequency output and RS 485 sealing:



6.3.14. MAGX2 Material Approval Certificate – Morocco

Royaume du Maroc
Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique

المملكة المغربية
وزارة الصناعة والاستثمار والتجارة والاقتصاد الرقمي

CERTIFICAT D'APPROBATION DE MODELE
N° MA.10.53.17 du 27 Avril 2017
***

INSTRUMENT	:	**COMPTEUR D'EAU**
DEMANDEUR	:	**MAIRAV** **658, Angle Prince Sidi Med & Bd Med V Res Zine** **Al Mahaba N°504 BP : 2318** **Casablanca**
FABRICANT	:	**Arkon Flow Systems** **Berkova 534/92, 612 00 Brno** **République Tchèque**
CARACTERISTIQUES	:	
MARQUE	:	**ARKON**
MODELE	:	**MAGX2**
CLASSE	:	**2**

Le présent certificat est délivré en application du décret n° 2-05-813 du 25 Joumada I 1430 (21 mai 2009) relatif au contrôle des instruments de mesure et de l'arrêté du Ministre de l'industrie, du commerce et des nouvelles technologies n° 3594-12 du 13 Safar 1434 (27 décembre 2012) relatif aux compteurs d'eau.

Le Secrétaire Général du Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique
Signé: Latifa ECHIHABI

Royaume du Maroc

ANNEXE :
- Note descriptive

DMLI/J/313-1
Rév-00-02-03

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الهاتف : 27 52 76 37 212 5 +/00 93 73 37 212 5 +
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Quartier Administratif C. P. : 10 010 - Rabat Chellah - Maroc
Tél.: + 212 5 37 73 93 00/+ 212 5 37 76 52 27
Fax : +212 5 37 76 62 65
www.mcinet.gov.ma

6.3.15. MAGB1 Material Approval Certificate – Morocco

Royaume du Maroc
Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique

المملكة المغربية
وزارة الصناعة والاستثمار والتجارة والاقتصاد الرقمي

CERTIFICAT D'APPROBATION DE MODELE
N° MA.10.52.17 du 27 Avril 2017
***

INSTRUMENT	:	**COMPTEUR D'EAU**
DEMANDEUR	:	**MAIRAV** **658, Angle Prince Sidi Med & Bd Med V Res Zine** **Al Mahaba N°504 BP : 2318** **Casablanca**
FABRICANT	:	**Arkon Flow Systems** **Berkova 534/92, 612 00 Brno** **République Tchèque**
CARACTERISTIQUES	:	
MARQUE	:	**ARKON**
MODELE	:	**MAGB1**
CLASSE	:	**2**

Le présent certificat est délivré en application du décret n° 2-05-813 du 25 Joumada I 1430 (21 mai 2009) relatif au contrôle des instruments de mesure et de l'arrêté du Ministre de l'industrie, du commerce et des nouvelles technologies n° 3594-12 du 13 Safar 1434 (27 décembre 2012) relatif aux compteurs d'eau.

Royaume du Maroc

Le Secrétaire Général
du Ministère de l'Industrie,
de l'Investissement, du Commerce
et de l'Economie Numérique
Signé: Latifa ECHIHABI

ANNEXE :
- Note descriptive

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Rév-00-02-03

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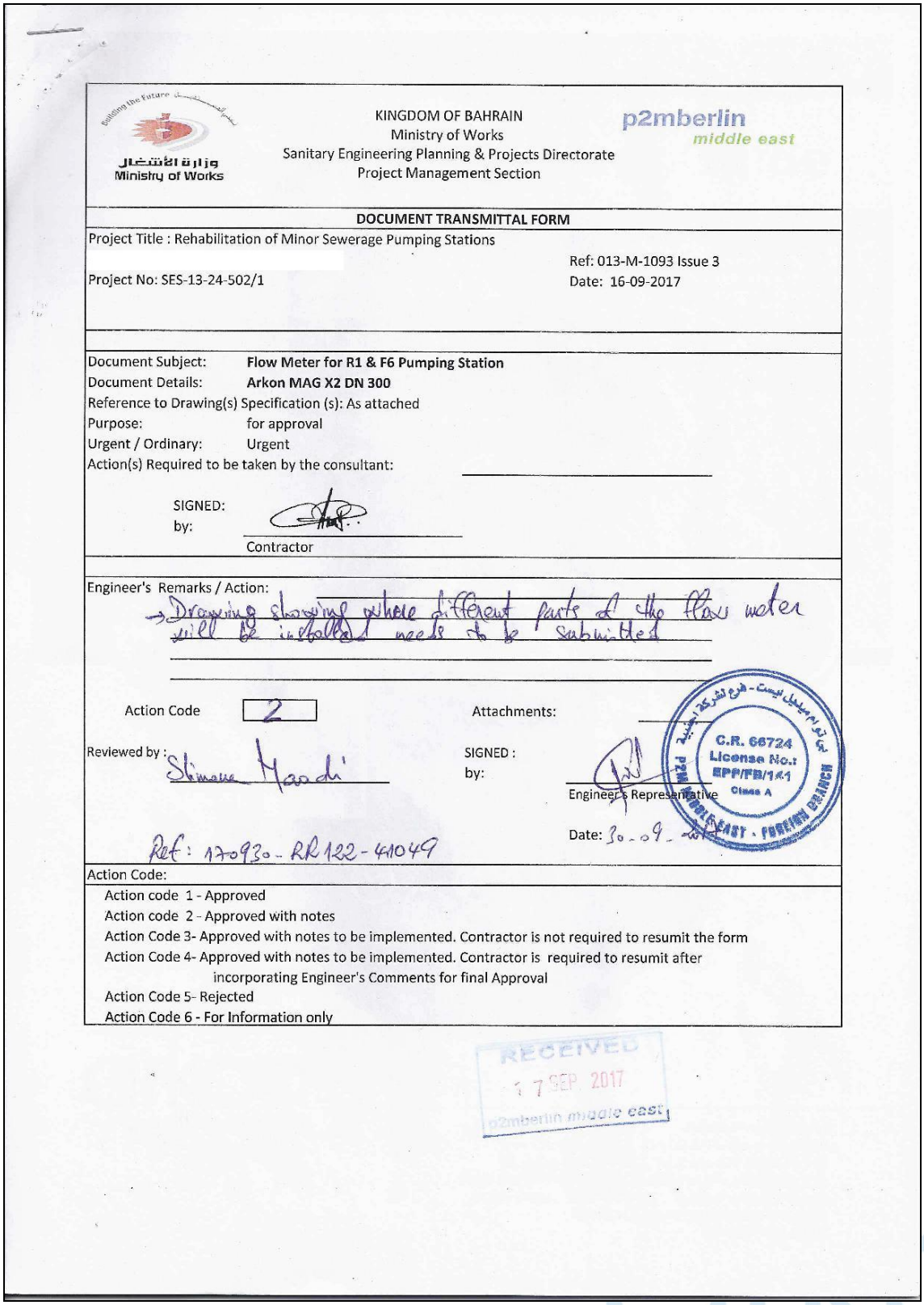
6.3.16. Ministry of Works, Kingdom of Bahrain approval



KINGDOM OF BAHRAIN
Ministry of Works
Sanitary Engineering Planning & Projects Directorate
Project Management Section

وزارة الأشغال
Ministry of Works

p2mberlin middle east

DOCUMENT TRANSMITTAL FORM

Project Title : Rehabilitation of Minor Sewerage Pumping Stations

Project No: SES-13-24-502/1

Ref: 013-M-1093 Issue 3
Date: 16-09-2017

Document Subject:	**Flow Meter for R1 & F6 Pumping Station**
Document Details:	**Arkon MAG X2 DN 300**
Reference to Drawing(s) Specification (s):	As attached
Purpose:	for approval
Urgent / Ordinary:	Urgent

Action(s) Required to be taken by the consultant:

SIGNED:
by:
Contractor

Engineer's Remarks / Action:
→ Drawing showing where different parts of the flow meter will be installed needs to be submitted

Action Code 2

Attachments:

Reviewed by : Shimaa Mandi

SIGNED :
by:
Engineer's Representative

C.R. 66724 License No.: EPF/FB/1A1 Class A
P2M MIDDLE EAST - FOREIGN BRANCH

Date: 30-09-2017

Ref: 170930-RR122-41049

Action Code:

Action code 1 - Approved
Action code 2 - Approved with notes
Action Code 3- Approved with notes to be implemented. Contractor is not required to resumit the form
Action Code 4- Approved with notes to be implemented. Contractor is required to resumit after incorporating Engineer's Comments for final Approval
Action Code 5- Rejected
Action Code 6 - For Information only

RECEIVED
17 SEP 2017
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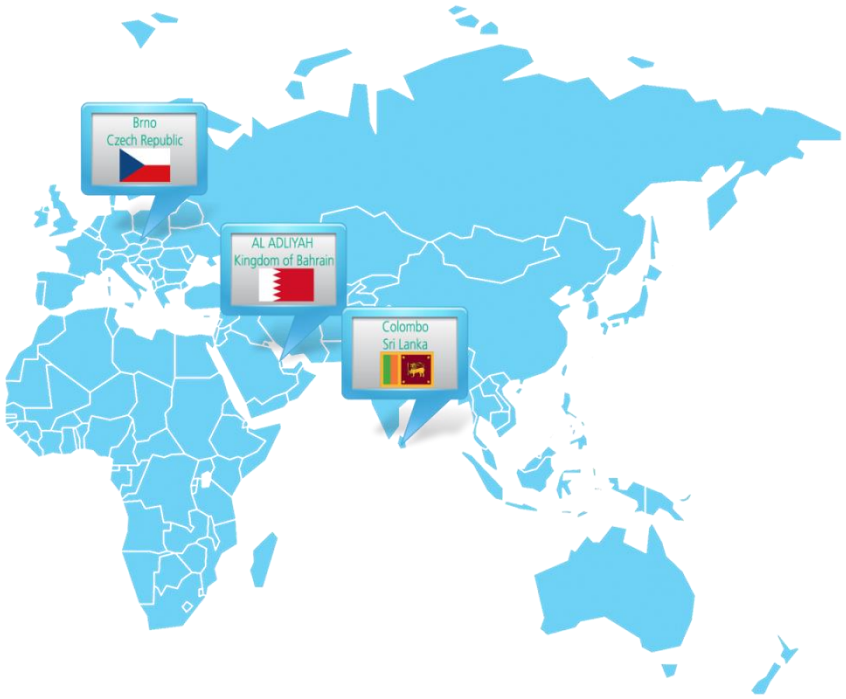
7. Reference Installation

Ministry of works-Bahrain

Al Shakhi water distribution plant

Ministry of works-Bahrain-open channel radar system

8. CONTACTS



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