DRAWELL
Artist of Science

DW-W4 Optical Emission Spectrometers (Arc/Spark-OES)

Economical and Easy Metal Analyzer

DW-W4 Optical Emission Spectrometer is most suitable instrument for the determination of various elements in different matrices (Fe, Cu, Al, Ni, Co, Mg, Ti, Zn, Pb, Sn, Ag, etc). It is an economical and easy solution to quick analysis near the furnace, metal material quality analysis, research laboratories and metal grade identification. This also gives the user a truly economical spectrometer that's both easy to use and easy to space saved. The optical system uses a CMOS detector with a spectral range covering all typical materials. It can accurately and reliably analyze from low-level elements to high-content elements.

Scope of supply

1.Supply list

No.	Item	Specifications	QTY	Unit	Remarks
1	Optical Emission Spectrometer	DW-W4	1	Set	Include in quotation.
2	Business computer		1	Set	
3	Printer		1	Set	
4	Tungsten electrode		1	Pc	
5	Electrode pressure spring		1	Pc	
6	The electrode fixed screw		2	Pcs	
7	Electrode brush	Φ6	2	Pcs	
8	Lens holder sealing ring	Φ16×2.65	2	Pcs	
9	Lens holder sealing ring	Φ72×2.65	1	Pc	
10	Exhaust gas filter core		1	Pc	
11	Degreasing cotton		15	G	
12	Power socket		1	Pc	
13	M2 Internal hexagonal wrench		1	Set	
14	M4 Internal hexagonal wrench		1	Set	
15	Long handle phillips screwdriver		1	Pc	
16	13－15 fixed wrench		1	Pc	
17	Spark machine screw	M6	4	Pcs	
18	Fuse	10A	2	Pcs	
19	Argon gas pressure reducing valve		1	Pc	
20	Argon gas pipeline		2	M	
21	Exhaust pipe		1	Pc	
22	Gas bottle		2	Pcs	
23	Print paper		1	Pc	
24	Spectrometer manual		1	Set	

Notes: The Buyer knows and agrees that the Seller may adjust the supply when the production of the above-mentioned instruments, spare parts and other suppliers change due to technological progress, product upgrading, market changes, etc.

2. Optional items:

Optional item	Qty	Note
High purity argon gas (pure ≧ 99.999%)	1 bottle	Should prepare by customer. If can't get should use argon purifier to get 99.999% argon gas.
Small air conditioning	1 set	Essential, customer should prepare by themselves.
High precision magnetic saturation voltage stabilizer (1KVA)	1 set	Need for voltage instability, if the customer uses intermediate frequency furnace, then need 3KVA Voltage Stabilizer
Argon purifier	1 set	When argon gas is not as pure as 99.999%.
Samples grinder (ferrous metals) or Mini lathe (non-ferrous metals)	1 set	Essential
Type samples	pieces	Essential for foundry

Analytical Program

The analysis ranges and elements of Fe base

		Fe-000	Fe-001	Fe-002	Fe-003	Fe-004	Fe-005	Fe-006	Fe-007
No.	Elements	Global Program	Low Alloy Steel	Cast Iron	Cr/Ni Stainless Steel	High Mn Steel	High Cr Cast Iron	High Ni Cast Iron	High Speed Tool Steel
1	C	0.006-4.5	0.006-1.3	1.8-4.5	0.008-2.5	0.5-2.4	0.9-3.4	1.2-3.8	0.08-2.2
2	Si	0.01-4.2	0.01-2.9	0.2-4.2	0.09-4.0	0.3-1.7	0.2-2.5	0.04-3.5	0.04-1.5
3	Mn	0.001-23	0.03-14	0.06-4.7	0.12-16	5.3-23	0.1-2.4	0.001-6.8	0.04-1.7
4	P	0.0015-0.8	0.002-0.12	0.02-0.8	0.003-0.3	0.01-0.2	0.01-0.3	0.0015-0.56	0.004-0.007
5	S	0.0015-0.46	0.002-0.46	0.003-0.2	0.001-0.4	0.006-0.11	0.01-0.15	0.0015-0.24	0.001-0.06
6	Cr	0.0015-25	0.01-12.5	0.03-2.8	7.4-25	0.08-3.8	0.4-34	0.0015-9.1	1.8-8.1
7	Ni	0.0025-22	0.004-4.4	0.05-5.1	0.8-22	0.04-3.5	0.05-2.75	0.9-36.6	0.07-0.55
8	Mo	0.0015-9.4	0.004-1.76	0.01-2.1	0.08-4.2	0.1-2.0	0.1-4	0.0015-1.5	0.02-9.4
9	Al	0.003-1.7	0.003-0.5	0.002-0.25	0.005-1.7	0.008-0.12			0.005-1.6
10	Cu	0.002-4.5	0.002-0.7	0.06-2.0	0.05-4.5	0.02-0.6	0.06-1.5	0.005-0.3	0.04-0.5
11	Co	0.001-16	0.001-0.5	0.008-0.03	0.008-0.62	0.007-0.1			0.008-16
12	Ti	0.002-1.1	0.002-0.5	0.007-0.7	0.005-1.1	0.004-0.4	0.01-0.14		
13	Nb	0.002-2.0	0.002-0.53	0.002-0.7	0.02-2.0	0.08-0.42	0.1-0.7	0.003-0.38	
14	V	0.003-2.5	0.003-0.9	0.01-0.7	0.02-0.58	0.01-0.84	0.02-1.2		0.03-2.5
15	Mg	0.001-0.14		0.001-0.14				0.005-0.025	
16	B	0.006-0.3	0.006-0.02	0.002-0.3	0.007-0.02				
17	Zr	0.004-0.45	0.004-0.45						
18	La	0.002-0.12		0.002-0.12					
19	Ce	0.002-0.1		0.04-0.1				0.002-0.02	
20	W	0.007-12	0.03-2.1	0.007-1.0					0.06-12
21	Fe	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Fe-007

The analysis ranges and elements of Al base

		Al-000	Al-001	Al-002	Al-003	Al-004	Al-005
No.	Elements	GlobalProgram	Al Low Alloy	Al-Si Alloy	Al-Zn Alloy	Al-Cu Alloy	Al-Mg-Si Alloy
1	Si	0.01-24	0.01-1.63	0.02-24	0.02-9.4	0.02-7	0.02-2.3
2	Fe	0.01-4	0.01-1.65	0.02-4	0.03-1	0.05-1.9	0.07-0.80
3	Cu	0.002-13	0.002-1	0.005-6	0.01-4.3	0.01-13	0.07-1
4	Mn	0.001-2.4	0.001-1	0.005-1	0.02-1	0.05-1	0.03-2.4
5	Mg	0.002-10.2	0.002-1	0.01-1.5	0.01-4	0.01-2.7	0.006-10.2
6	Cr	0.001-0.5	0.001-0.15	0.005-0.5	0.01-0.4	0.01-0.14	0.01-0.4
7	Ni	0.001-2.5	0.001-0.16	0.02-2.5	0.01-0.2	0.01-2.3	0.005-0.25
8	Zn	0.002-12	0.002-0.5	0.005-3.5	0.01-12	0.05-3.5	0.01-1
9	Ti	0.001-0.4	0.001-0.15	0.005-0.4	0.005-0.3	0.001-0.2	0.007-0.3
10	Cd	0.001-0.3	0.01-0.3	0.001-0.3	0.002-0.3	0.01-0.3	0.01-0.3
11	Pb	0.001-0.5	0.02-0.5	0.005-0.5	0.005-0.5	0.01-0.5	0.001-0.5
12	Sb	0.005-0.4		0.005-0.4			
13	Sn	0.005-0.5	0.01-0.2	0.003-0.5	0.005-0.2	0.02-0.3	0.007-0.2
14	Sr	0.005-0.1		0.005-0.1			
15	V	0.002-0.2	0.004-0.05	0.005-0.2	0.005-0.03	0.01-0.03	0.002-0.03
16	Zr	0.001-0.3	0.001-0.12	0.005-0.2	0.01-0.3	0.001-0.2	0.003-0.12
17	p	0.002-0.005		0.002-0.005			
18	Al	Reference	Reference	Reference	Reference	Reference	Reference

The analysis ranges and elements of Cu base

		Cu-000	Cu-001	Cu-002	Cu-003	Cu-004	Cu-005	Cu-006	Cu-007
No.	Elements	Global Program	Brass	Copper	Al-Cu Alloy	Beryllium Bronze	Sn-Pb-Cu Alloy	Pure Copper	Si-Bronze
1	Zn	0.001-43.0	0.5-43.0	0.01-23.0	0.04-2.2	0.005-0.23	0.003-0.7	0.001-0.3	0.2-6.0
2	Pb	0.001-21.0	0.01-6.0	0.002-0.13	0.002-0.068	0.005-0.3	0.001-21	0.001-1.5	0.01-08
3	Sn	0.001-11.2	0.009-4.8	0.009-0.13	0.003-0.35	0.005-0.18	0.005-11.2	0.001-0.3	0.05-0.7
4	P	0.001-0.42	0.002-0.14	0.003-0.07			0.001-0.42	0.001-0.078	0.005-0.08
5	Mn	0.001-5.3	0.001-5.3	0.009-1.1	0.001-3.1		0.001-0.4	0.001-0.1	0.2-1.8
6	Fe	0.001-6.0	0.02-3.0	0.03-1.03	0.005-6.0	0.02-0.28	0.003-0.028	0.001-0.2	0.1-1.7
7	Ni	0.001-32.5	0.009-1.8	5.5-32.5	0.002-6.0	0.005-0.35	0.001-1.0	0.001-0.5	0.05-1.0
8	Si	0.001-5.0	0.001-4.6	0.009-0.46	0.004-0.3	0.02-0.3	0.002-0.009	0.001-0.055	1.5-5.0
9	Mg	0.001-0.7	0.001-0.01	0.003-0.14		0.003-0.7		0.001-0.01	
10	Cr	0.001-0.2	0.001-0.2					0.001-0.081	
11	Ag	0.001-0.06					0.001-0.14	0.006-0.13	
12	Co	0.001-0.1	0.004-0.1				0.001-0.1		
13	Al	0.001-12.9	0.001-6.7		3.0-12.9	0.02-0.2	0.01-0.1		
14	S	0.001-0.15	0.001-0.15	0.004-0.06			0.001-0.14	0.001-0.05	
15	Cu	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference

Note:

The instrument is calibrated with limited standard samples which Chongqing Drawell Instrument Co., Ltd have for general purpose. For special alloy and special elements, the instrument must be calibrated by customer themselves. Or if customer is willing to provide sample collaboration for program development, the customer must provide accurate sample element content tables and ensure sample uniformity, but such curves are not used as acceptance indicators of the instrument.

If the customer has type sample demand, the type sample number can be provided, and the customer can purchase the type sample by himself, if the salesman buy the type sample on behalf of the salesman, the type sample will be shipped separated by Chongqing Drawell.

Technical Data of DW-W4

1. Parameter

Item		Index
Optical System	Focal Length	350mm
	Wavelength range	165nm-589nm(extendable)
	Detector	High resolution CMOS Multi detectors
	Light chamber	Argon cycle filling
	Pixel resolution	30pm
	Grating line	3600m1/mm
	First order spectral line dispersion rare	1.2nm/mm
	Average resolution ratio	10pm/pixel
	Full spectrum	
	Light chamber temperature is controlled automatically	
Spark Source	Type	Digital arc and spark source
	Spark frequency	100-1000HZ
	Discharge current	1-400A
	Ignition voltage	>15000V
	Excitation light	Optimization of discharge parameters design
		High energy precombustion technology HEPS
	Processor	High-speed data synchronization acquisition and processing
Spark Stand	Electrode	Tungsten electrode technology
	Make up	Thermal deformation self-compensation design
	Argon flushed with minimal consumption of Argon	
	Spray discharge electrode technology	
	Adjustable electrode technology	

Others	Measurable elements	Fe、Al、Cu、Ni、Ti、Co、Zn、Sn、Mg、Pb etc
	Dimension	714mm(L)*558mm*270mm(H)
	weight	About 40kg
	Storage temperature	0℃-45℃
	Operating temperature	10℃-35℃, 23±2℃ is recommended
	Power	AC220V/50Hz(Customized)
	Power consumption	Excitation:400W/Stand by:50W
	Argon quality	99.999%, Argon pressure>4Mpa
	Argon consumption	5L/min during spark mode
	Interface	Ethernet data transmission based on DM9000A

2. Main features

The DW-W4 optical emission spectrometer has a number of patented technologies that enable rapid determination of elements in metallic materials. The optical system uses a CMOS detector with a spectral range covering all typical materials. It is accurate and reliable for analysis from low-level elements to high-level elements. For different materials and different requirements, the cost-effective full-spectrum direct reading spectrometer can meet the requirements of metal manufacturing, processing industry and metal smelting for quality monitoring, material identification, material research and development.

● Optical system with superior performance

The Paschen-Longge structure concave grating, full spectrum coverage, meets the customer's need for full element detection.

Direct optical technology and use optics made with MgF materials ensure optimum performance in the UV region.

High resolution multi-CMOS readout system, lower dark current, better detection limit, higher stability, stronger sensitivity, meet N analysis requirements.

● Large energy digital spark light source

Fully digital intelligent composite light source DDD technology brings superior analytical performance.

The compact design and semiconductor control technology make the light source more stable and more reliable.

High-energy pre-combustion technology(HEPS), spark parameter adjustment, fully meet the excitation requirements of different substrates, different samples and different analytical elements.

● Humanized sample spark stand design

The spark stand directly introduces the spark light into the optical system

Open sample stage for large sample testing requirements.

Change electrodes provide better performance for small sample and complex geometry samples

● Simple argon flow design

Intelligent argon flow design and dust collection and cleaning device

The unique argon jet technology effectively eliminates the drift of the plasma during the spark process, ensuring that the CCD detector can observe the high-temperature regional light signal, improving accuracy and stability.

After sparking, pulsed argon purge improves dust removal and improves instrument short-term and long-term stability.

● Fully intelligent vacuum measurement and control

The vacuum system is fully programmed to reduce the running time of vacuum pump while ensuring the vacuum.

The two-stage setting turns on the standby vacuum operation state when the instrument is not running.

Multi-stage vacuum isolation measures and the addition of oil filter devices ensure that optical components work in a reliable environment.

● Convenient and quick lens cleaning device

The integrated vacuum ball valve has good isolation when cleaning the lens.

Single-plate lens design, easy to assemble and disassemble.

Cross-mechanical devices, the optical system is effectively protected without isolation.

- **Cloud computing and reading system**

The computer and mobile phone (or PAD) can be displayed simultaneously for easy panel operation.

High resolution multi-CMOS readout system and FPGA, DSP and ARM technology for data acquisition.

Ethernet and TCP/IP protocols, data transmission is fast and reliable.

Data can be transmitted remotely and fully networked. Real-time monitoring and control of the operating state of the instrument.

Data can be cloud printed.

- **Dedicated spectral analysis software**

The international spectrometer produces a standard dedicated spectrometer software with user-friendly interface and standardized functions.

The instrument is equipped with multiple factory calibration curves and more material analysis methods and advanced solutions in the software.

The upper and lower limits of the standard curve can be extended on site according to the material requirements of the user.

- **The instrument and software computing power is powerful**

Automatic optical path calibration

Low argon consumption

Universal adjustable sample adapter

Base extension

Standardized parameter modification

Type standardization function

Safer, more open and convenient design

The result is displayed in real time, and the print report function can be customized for the user.

Software rapid diagnosis

Simple interface operation

Reliable factory calibration

Guarantee & Service

1. Technical documents and software

1.1 Drive and application software installation CD

1.2 User manuals

1.3Daily maintenance sheet

2. Installation

The Seller’s professional technicians will install the instruments and training the users within 2 to 3 workdays for free.

Commissioning will be taken before acceptance. Both parties should sign the acceptance report after the instrument reaches all the technical data prescribed in this agreement.

3.Acceptance

The Buyer should acknowledge receipt of goods after checking them against the list shown in the agreement.

After the instrument runs steadily at least 24 hours, the testing results should be reached the technical data by using the homogeneous national or international first grade CRM.

4. Training

Installation Engineer in the field installation and commissioning process, the Buyer shall organize the relevant users and maintenance responsible person to receive on-site training, training time generally not more than 3 days. Through training, so that the relevant personnel more in-depth understanding of spectral analysis related technologies, skilled in instrument operation and maintenance.

The training includes instrument installation, commissioning, testing samples, testing user’s samples, training lab operators about equipment theory, daily operation, software application, daily maintenance and repair, to make sure that users can operate the instrument properly.

5. After-sales service

5.1 The calculation of the warranty period

● The warranty period of the instrument shall be in accordance with the contract stipulations.

● If the contract does not specifically point out that the warranty shall be implemented in accordance with the following terms:

The warranty period shall be 12 months from the date of acceptance of the goods or 12 months from the date of receipt of the goods by the buyer, whichever comes first.

The general fragile parts (such as mouse, ordinary keyboard, etc.) are guaranteed for three months from the date of the factory.

The warranty period for external parts (PC, printer, stabilized power supply, etc.) is subject to the manufacturer's requirements.

The repair period is three months.

Consumables (filter cotton, electrode brush, etc.) are not guaranteed.

● If the quality problem of the instrument is affected, the warranty period will be postponed accordingly.

5.2 During the warranty period, the equipment will be repaired free of charge if it breaks down in normal use. However, due to the buyer's operation or maintenance personnel's mis-operation or improper use and force majeure factors (war, earthquake, lightning strike, flood and so on), the seller will charge cost and maintenance fees.

5.3 After the instrument has been repaired, the seller confirms the malfunction by telephone and solves the problem. If the problem needs to be solved on site, the seller can rush to the site within 48 hours.

5.4 Maintenance beyond warranty period:

Over the warranty period, the seller will continue to provide maintenance services and use of consultation, if need to go to the customer site service, the Seller will properly charge parts fees, service fees and other fees.

5.5 Spare parts and consumable supplies: the seller will supply spare parts and consumables to the buyer at a favorable price.

Installation & Training

After the seller received the buyer's instrument installation notice, sent to the user's site for installation and debugging. It’s totally free.

The buyer only bears our engineer round airfares and local accommodation (Including the VISA cost).

1. Installation Conditions see Attachment 1 and Attachment 2.

2. After the instruments have arrived at your esteem company, warehouse storage, warehouse temperature 0 ~ 30 ℃, relative humidity is not more than 75%, after waiting for installation personnel arrived, mutual unpacking, counting number according to the packing list.

3. Use the standard sample which is bought by your esteem company for instrument acceptance at the scene and check the analysis precision. Or if the customers don’t know the standard samples at all, we company can help customer buy from China and ship together with the machine.

4. After installation and debugging, it must be paid to return if the quality can’t meet the technical requirements. If only individual elements analysis deviation is slightly larger, mutual analysis reason, through friendly consultation.

5. The training includes how to use the instrument, daily maintenance, software operation.

6. After installation completely, Engineers need to complete an installation acceptance report, and on behalf of the signature or stamp by both parties.

7. Warranty period in accordance with the contract to perform

Attachment 1 Installation conditions should be prepared by buyer.

1.Space: The optical room and sample prepare room should separately. In order to operate convenient, please leave 1 meter space around the instrument.

2.Prepare two bottles of high purity argon gas, the purity should be more than 99.996%.

3.Spectrometer access side should be equipped with power protection, air switch, over-current protection of the 20A

4.Independent special ground, ground resistance is less than 1 ohm, grounding body with 38 ~ 50 mm diameter copper bar, its length is 2.1 m, the method of making the ground see the attachment.

5.According to the space of the laboratory, it should be equipped with air conditioner.

6.Equip with a double disc grinding prototype or a floor grinder, mill Φ 350 mm diameter, used in steel specimen surface polishing, generally need 40-60 mesh. If the sample is non-ferrous metals, need a small lathe to sampling.

7.In order to ensure the argon gas purity, need to configure an argon gas purifier. If the purity is more than 99.999%, it will not be necessary.

8.The standard sample should be prepared by the user. It is used for the calibration function.

9.Equip with a high precision regulated power supply if it is before the furnace analysis or harmonic interference.

Note

Spectrometer power supply system should be separate with high power electric equipment (such as the power of the medium frequency furnace and its frequent start-stop devices).

Stay away from high-power electrical appliances at least 50 m or so.

Spectral laboratory dustproof effect should be good.

Spectral instrument avoid single heat or direct sunlight.

Attachment 2 The installation of ground wire method

Grounding resistance requirement

(1) Resistance<2Ω

The value of the grounding resistance can define the value of earth current. If grounding electric resistance is smaller, the grounding device of grounding voltage value will be smaller. That is to say, the value of the grounding resistance has marked the equipment grounding performance is good or bad.

Resistance measurement

Grounding resistance is generally measured by ammeter, voltmeter, bridge method, grounding resistance measuring instrument etc. At present it is measured by grounding resistance measuring instrument. This method is simple and convenient. Common grounding resistance measuring instrument is the type of ZC - 8 and ZC - 29. Before the grounding resistance test, it should unscrew the ground down lead first.

Installation

Generally speaking, a ground wire buried depth should not be less than 2 m. Installation of grounding in special places, if the depth of less than 2 m should be placed around the grounding salt 5 kg, wood carbon about 10 kg and add water, to reduce the grounding resistance. If you use a minimum of 2 and 2 root of grounding, the distance between each pole should not be less than 2.0 m, in order to reduce the diaspora of the earth resistance. In strong corrosive soil, it should use plating of copper or galvanized grounding electrodes. And grounding shall not be buried in the garbage and ash layer, laying on the ground and the ground is extremely should not be painted, in order to avoid the grounding resistance is too big.