



Online Coal Quality Detection Solution



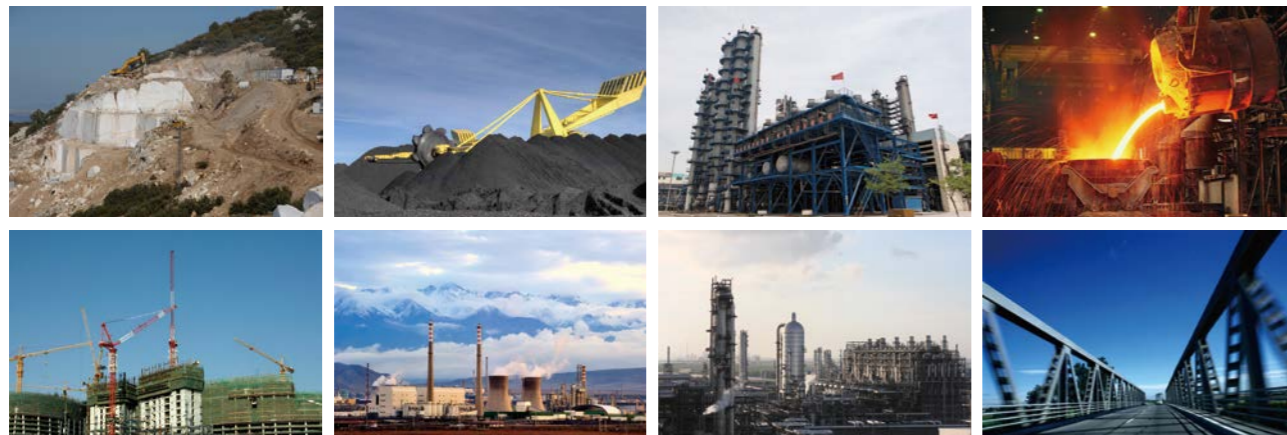
Dandong Dongfang Measurement & Control Technology Co., Ltd.

COMPANY PROFILE

Situated in Dandong, one of the most beautiful border cities in China, Dongfang Measurement & Control Technology Co., Ltd., hereinafter referred to as DFMC, is one specialized mine automation engineering company as well as a large instrument manufacturer which is the largest in China, occupies over 90% market share in the field of mineral processing automation that has been implemented. At present, we have over 1,000 engineers all over the world.

Since established in 1996, we already have 12 kinds of internationally advanced online measuring analyzers and more than 100 measurement and control systems which were independently researched and developed. With the technologies covering GPS guidance, PGNA, XRF, ultrasound, infrared, micro-wave, radar, etc. DFMC utilized hundreds of applications in metallurgical, mine, cement, building materials, chemical, coal and other industries.

DFMC is committed to helping clients to realize high quality, high output, energy-saving and consumption reduction to achieve sustainable development for a better world.



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Manufacturing Execution System

1. System Overview

Manufacturing Execution System (MES) can realize the integration and connection of the business and control systems, coordinate the production of the upper and lower links and integrate the various business management. MES can provide real-time production data required for production management personnel at all levels, through intelligent analysis and tracking of production data, digging equipment and work potential constantly, to improve production efficiency and reduce production cost, and to improve the yield and reduce unplanned downtime, and to continuously improve management objectives and to achieve lean production.



2. System Functions

■ Process monitoring

The production configuration screen is released through web, breaking through the regional limit. Online real-time monitoring of plant major equipment operating parameters and operation status of important process flows, and integrated video monitoring signal. The visual picture expresses the field production process. Combined with real time database, the history replay function of configuration picture can be realized.

■ Production scheduling

Collect business data during the production process and monitor the production control process and equipment operation of each process. Automatic summarize statistics and generate scheduling report. Timely identify problems or potential problems in the production process. And coordinate maintenance and security apartments to solve problems and ensure that production is carried out in a safe, orderly, and smooth manner.

■ Production statistics

To store, count, and summarize professional data such as output, quality, equipment, materials, energy, etc. According to the statistics and analysis of departments and business, special statistical reports and trend charts can be formed. The effective and integrated display of useful information scattered in every link of production is carried out to realize the visualization of data.

■ Energy management

To realize the collection and management of energy information of various production plants, such as water, electricity, gas and coal. Through the collection and analysis of energy data, it shows the energy consumption process to help users to determine abnormal energy consumption. Instant alarm on abnormal energy consumption and abnormal equipment. After the digital instrumentation of the process is completed, the system has the ability to count single-machine energy consumption, accurately calculate equipment efficiency, and manage process energy consumption.

■ Security management

Through security monitoring, safety pre-warning, quality standardization, hidden danger investigation and follow-up processing, the system uses digital technology measures and process control to improve the quality of safety management and avoid accidents.

■ Equipment management

Through the management and information collection of equipment inspections, maintenance and repairs, etc. Regulate and supervise the day-to-day work of equipment management and record planned and unplanned production downtime events. Using statistics to form chart analysis results such as equipment running rate and failure rate. Through real-time storage of the key operating parameters of the device, it helps the users to trace the abnormal equipment and supervise the operation.

■ Quality management

Realize the management of important business processes such as quality inspection and testing in the production process. Collect, calculate and summarize quality data, and report alarms on abnormal data and alarm the key data abnormality to realize data statistics, analysis, publishing, sharing, and providing form printing function.

■ Material consumption

Integrate the material consumption data of the workshop, including raw materials, consumables, reagents, large spare parts and so on. Combined with budget management, the cost assessment of production units can be realized. According to all the materials of a workshop, single material can be viewed separately. At the same time, according to the needs of users, it can increase the business of fixed materials, spare parts recovery/disposal, etc.

3. Application Cases

China Railway Resources Yichun Luming Mining Co., Ltd.

China Gold Group Inner Mongolia Mining Wunutu Tushan Copper and Molybdenum Mine.

China Coal Pingshuo Coal Industry Limited Jinggong No.1 Mine.

Elemental Analyzer

1. Product Overview

Elemental Analyzer (EA-coal) is an online cross-belt coal quality detecting device that adopts online prompt gamma neutron activation analysis (PGNAA) technology. Online analysis of sulfur, ash, moisture and calorific value and other indicators in the coal, has great significance for coal mining, coal washing, coal blending, on-line testing of blended coal and its production process control.



2. Product Principle

EA-coal adopts prompt gamma neutron activation analysis (PGNAA) technology.

3. Product Features

Multi-element analysis

Simultaneous analysis of the contents such as S, Si, Al, Fe, Ca, K, Na, Ti, Cl and other elements in coal.

Multi-index analysis

The calorific value, ash content, sulfur content, moisture and ash composition (SiO₂, Al₂O₃, Fe₂O₃, CaO, etc.) are analyzed simultaneously.

High analysis accuracy

Detection of whole coal flow, no artificial sampling error.

Fast analysis

A set of test results can be given in 1 minute.

4. Product Parameters

Applicative conveyor(mm)	650	800	1000	1200	1400	1600	1800	2000	Other sizes
Analyzer length(mm)	2200	2200	2200	2200	2200	2100	2100	2100	Customized
Analyzer width(mm)	1900	1900	1900	2100	2100	2300	2500	2700	Customized
Analyzer height(mm)*(mm)	1600	1600	1600	1650	1650	1700	1750	1800	Customized
Weight(kg)	2800	2800	2800	3000	3100	3300	3500	3700	Customized
Angle of support groove	30°~ 45°								
Neutron source	²⁵² Cf								
Normal working temperature	-30℃ ~50℃ (when the site environment temperature below -10 C, it needs to establish an independent information processing room at the site)								
Power supply	230VAC, 50HZ, 6A, 3-wire (L、 N、 GND)								
Signal processing cabinet to Host computer	Optical fiber communication								
Analysis time	1 minute, settable by user								
Measuring parameters	Ash content, moisture content (Microwave method), sulfur content, SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , CaO, TiO ₂ , Na ₂ O, K ₂ O and etc.								
Calculating parameters	calorific value and any possible parameters that can be used by the empirical formula.								

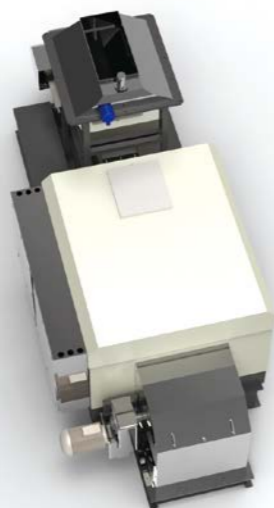
5. Product Application

It is mainly used for the online detection of coal mining, coal washing, coal blending and the quality of the mixed coal into the furnace and the process control of the production process. It can guide coal quality classification and coal blending.

Elemental Analyzer

1. Product Overview

Elemental Analyzer (EA-coal) is a by-pass coal material detecting device. It adopts prompt gamma neutron activation analysis (PGNAA) technology and can online analyze sulfur content, ash content, moisture, calorific value and other indexes of coal, which has an important significance in coal washing, coal blending, quality analysis of incoming and outgoing coal, blending of as-fired coal and its production process control, etc.



2. Product Principle

EA-coal adopts prompt gamma neutron activation analysis (PGNAA) technology.

3. Product Features

■ Multi-element analysis

Simultaneous analysis of the contents such as S, Si, Al, Fe, Ca, K, Na, Ti, Cl and other elements in coal.

■ Multi-index analysis

The calorific value, ash content, sulfur content, moisture and ash composition (SiO₂, Al₂O₃, Fe₂O₃, CaO, etc.) are analyzed simultaneously.

■ High analysis accuracy

Detection of whole coal flow, no artificial sampling error.

■ Fast analysis

A set of test results can be given in 1 minute.

4. Product Parameters

Total Length	4950mm
Total Width	2000mm
Total Height	2300mm
Radioactive Source	²⁵² Cf Neutron Source, ¹³⁷ Cs Gamma Source
Normal Operating Temperature	-30°C ~ 50°C
Power Supply	220VAC, 50HZ, 6A, 3-wire (L, N, GND) 380VAC, 50HZ, 125A, 3-phase 4-wire (L1, L2, L3, N)
Signal Processing Cabinet to Host Computer	Adopts optical fiber or ethernet cable to communicate.
Measuring Parameter	Ash content, moisture, sulfur content, SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , CaO, TiO ₂ , Na ₂ O, K ₂ O, etc.
Calculating Parameter	Calorific value. Any possible parameter that can use empirical equation.

5. Product Application

EA-coal is mainly used for quality analysis of incoming and outgoing coal, control of coal mixing, coal blending and its production process. Combined with truck, train or belt sampling device, it can detect incoming coal and present coal analysis data timely. In combination with mechanical sampling device, it can real-time detect coal information and realize coal blending function by manual or automatic controlling the feed quantity of various raw coal.

Ash Analyzer

1. Product Overview

Ash Analyzer (AA-D) is a kind of online coal ash measuring instrument developed by our company to meet the demands of clients and make up the shortcomings in traditional ash analysis, which can conduct rapid and accurate measurement on ash content of coal on the entire conveyer belt. It has such advantages as excellent stability, high measurement accuracy, easiness for installation and maintenance, etc. It saves the trivial processes of sampling, sample preparation, laboratory testing, etc., and no extra investment on factory building, etc. need to be input. It can be directly installed on the belt rack, without the need to make any alteration on the belt rack.



2. Operating Principle

AA-D uses dual-energy gamma ray transmission technology to obtain the ash content of coal.

3. Product Features

- **Real-time analysis:** The detection of the coal passing through the belt is totally real-time. The analyzer can give the instantaneous value and average of coal ash within any period according to the needs.
- **Representative measurement result:** The analyzer analyzes all the coal passing through the belt and overcomes the shortcomings of poor representativeness of the results of traditional assays, which only takes small portions for analysis.
- **Adaptability:** The analyzer uses the principle that signals can penetrate matter to achieve non-contact measurement.
- **Advanced:** The analyzer uses high-speed nuclear pulse signal processing to improve the dynamic response of the instrument.

4. Technical Parameters

- Measurement accuracy: 5%~50%
- In case of clean coal, the error is $\leq 0.5\%$, 1σ
- In case of low-ash raw coal, the error is $\leq 1.0\%$, 1σ
- In case of high-ash raw coal, the error is $\leq 2.0\%$, 1σ
- On-site ambient temperature range: $-20\text{C}\sim 45\text{C}$;
- On-site ambient humidity range: $\leq 95\%$, non-condensing;
- Long-term stability: Measure a standard block continuously for 24 hours, the deviation of any "ten-minute ash content" measurement value from the average value is less than 0.5%;
- The dose equivalent rate at 1m from the instrument surface is $\leq 2.5\mu\text{Sv/h}$. During normal use of this instrument, it won't cause any damage to the operators.

5. Product Application

AA-D can be widely used in coal mines, coal washery, coal blending, coking plant, coal-fired power plants, steelworks, coal wharfs, etc. for online measurement; it can also be used for coal preparation, coal blending process to automatically adjust and control the production process.

Ash Analyzer

1. Product Overview

Ash Analyzer (AA-D) is an offline analytical instrument for rapid and accurate analysis of coal sample ash content in industrial processes. The analyzer can directly measure the collected coal samples while meeting the particle size requirements. The measuring speed is fast, the representative of the results is good, and it has a very strong guiding significance for actual production.



2. Operating Principle

Dual-energy gamma-ray absorption.

3. Product Characteristics

- Big analysable sample size, the measurement results are representative;
- high accuracy, repeated measurement of good repeatability;
- simple procedures to reduce the labor intensity of workers and skills requirements;
- Non-contact measurement, the key components are not easily damaged;
- Small size, excellent safety performance.

4. Technical Parameters

- Measurement range: 5%~50%
- Measurement accuracy:
 - Clean coal: error $\leq 0.5\%$, 1σ
 - Low-ash raw coal: error $\leq 1.0\%$, 1σ
 - High-ash raw coal: error $\leq 1.5\%$, 1σ
- Typical measuring time: 3~5min
- Sample box volume: 6L
- On-site ambient temperature range: 0~45°C
- On-site ambient humidity range: $\leq 95\%$, non-condensing
- Repeatability: The root mean square error of the same sample is less than 0.2%
- Long-term stability: Measure a standard block continuously for 24 hours, the deviation of any "ten-minute ash content" measurement value from the average value is less than 0.5%;
- Radiation safety: Dose equivalent rate at 5cm from the instrument surface is $\leq 2.5\mu$ Sv/h, and that at 1m from the instrument is $\leq 0.25\mu$ Sv/h. It has no limitation on personnel range of activity. Normal use of this instrument will not cause any damage to the operators.

5. Product Application

AA-D can be widely used in coal mines, coal washery, coking plant, coal-fired power plants, steelworks, coal wharfs, etc.

Ash Analyzer

1. Product Overview

Ash Analyzer (AA-X) can be installed directly on the belt sampler and can online test the coal ash on the sampler.



2. Product Principle

The product combines the principle of X-ray fluorescence and X-ray absorption. Applying X-ray exposure to the coal sample, the intensity of the different energies will be measured, and the coal ash value was calculated through data analysis and processing.

3. Product Parameters

1) Measurement accuracy

- Ash content <15%, standard error $\leq 0.5\%$, 1σ
- Ash content 15~30%, standard error $\leq 1.0\%$, 1σ
- Ash content >30%, standard error $\leq 1.5\%$, 1σ

2) Operating environment

- Ambient temperature: $-35^{\circ}\text{C} \sim 45^{\circ}\text{C}$
- Relative humidity: $\leq 98\%$, non-condensing
- Power supply: three-phase AC 380V, 50 Hz, grounding resistance $< 4\Omega$

4. Product Features

- The X-ray tube is used to replace the radioactive source and when without power supply, there is no radiation.
- Measurement is not affected by particle size and density.
- Real-time online nondestructive testing of coal ash.
- Non-contact measurement.

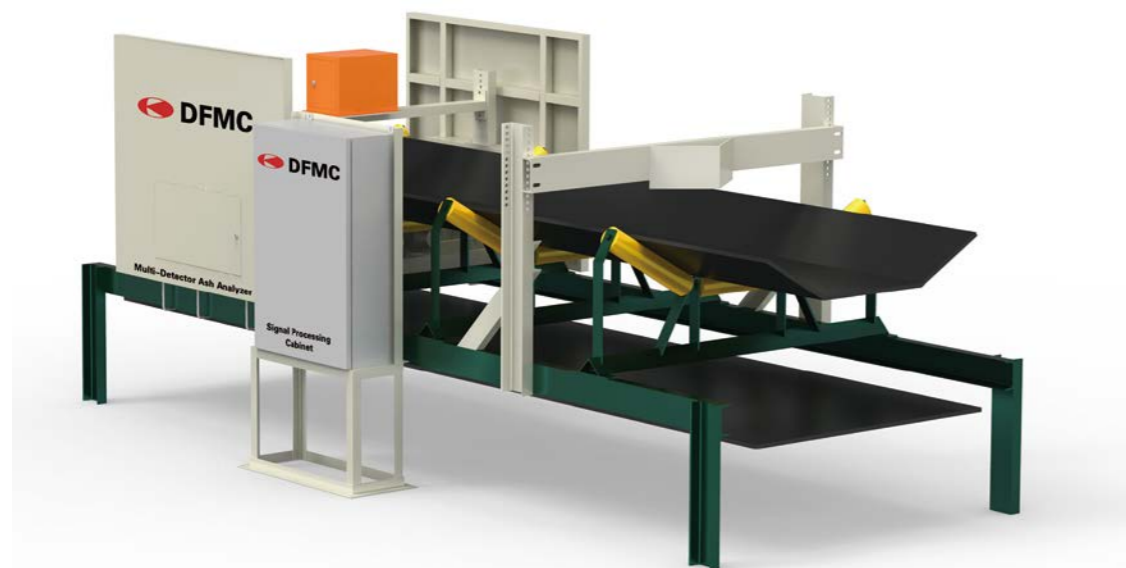
5. Product Applications

AA-X can be widely used in coal mines, coal washery, coal blending plant, coking plant, coal-fired power plants, steelworks, coal wharfs, etc.

Multi-Detector Ash Analyzer

1. Product Overview

Multi-Detector Ash Analyzer (AA-D) is an online measuring instrument that can continuously detect ash in coal at different locations on the belt. Different from the traditional "single source with single detector" measurement method, by arranging multiple detectors above the belt conveyor, the ash measurement at multiple locations on the cross-section of the belt conveyor can be realized. Therefore, the test result of the analyzer is more representative. The use of multiple detectors can eliminate some "random errors" of the entire analyzer which may affect the detection results. And the accuracy of the detection results is better. Meanwhile, the use of multiple detectors can also effectively reduce the influences to detection result caused by the uneven distribution of steel chord in belt conveyor and belt deviation. Thus, the instrument is more applicable at site. For its superior detection performance and site adaptability, AA-D can be widely applied in sites such as coal mining, processing and comprehensive utilization that require fast and accurate measurement of coal ash.



2. Product Principle

Dual energy γ transmission ash measurement is used as basic principle. Different from traditional single point measurement, in order to increase the representativeness of the results, a multi-point measurement method is adopted, which means the coal at different positions on the coal flow cross-section can be measured at the same time. Meanwhile, the instantaneous flow information of coal can be calculated through the multi-point measurement method. And by combining it with the instantaneous ash of coal, the average ash content within any period can be calculated.

3. Product Parameters

- Measurement range: 5%~50%
- Measurement accuracy: Clean coal: the error $\leq 0.3\%$, 1σ
Low-ash raw coal: the error $\leq 0.7\%$, 1σ
High-ash raw coal: the error $\leq 1.0\%$, 1σ
- Weight measurement accuracy: 0.5%~1.0%
- Measurement points: ≥ 3 points
- On-site ambient temperature range: $-20^{\circ}\text{C} \sim 45^{\circ}\text{C}$
- On-site ambient humidity range: $\leq 95\%$, Non-condensing
- Radiation safety: The dose equivalent rate at 1m from the instrument surface is $\leq 2.5\mu\text{Sv/h}$. Normal use of this instrument will not cause any damage to the operators.

4. Product Features

- Better representativeness. The measurement result is more closed to the real situation of the whole coal flow.
- Better measurement efficiency. The exact measurement result can be given in short time.
- More adaptable at site. Effectively reduce the influence of unfavorable conditions such as particle size fluctuations and belt runaway.
- Through the coal quantity monitoring results, weighted average can be achieved to obtain more accurate detection results.

5. Product Applications

- Online detection of coal ash fluctuations in real time.
- The test results can be used for guiding the coal preparation and coal blending production and can participate in the production of automatic control.

Ash Analyzer

1. Product Overview

Ash Analyzer (AA-N) is a safe and reliable online analytical instrument with distinguished performance. It can be applied to the real-time online measurement on ash content in coal. The instrument performs ash detection by detecting radiation emitted by natural radioactive materials contained in coal. Thus, the instrument contains no radioactive substance itself, it doesn't emit radioactive ray and is radiationless, safe and reliable. It can be used in the measurement of coal putting into the furnace of thermal power plant, raw coal of coal dressing plant, coming coal of coal washing plant, etc.



2. Product Principle

AA-N measures ash content through the ray emitted by the natural radioactive material exists within coal. In the compositions of coal, natural radioactive substances (Uranium 238, thorium 232, kalium 40) in the ash content (inorganic rock minerals) are far higher than fixed carbon, volatiles and other compositions, the coal ray particles number and its total ash content have positive correlation. Therefore, by measuring the particle number of ray emitted by coal ore and total amount of coal ore, the ash content in coal can be calculated.

3. Product Parameters

Lifetime	≥10
Weight	≤2.5t
Size	Length: 4000mm, width: belt support width +400mm, height: belt support height+600mm
Power source	Single phase AC220V, Power consumption ≤2000W
Protection level	IEC IP65
Communication interface	Ethernet/Modbus, RS232/485/Modbus, 4~20mA analog (optional)
Data output	Ash content value
Measuring accuracy	Clean coal (ash content < 15%) ≤ 0.5%, 1σ
	Low-ash raw coal (ash content < 25%) ≤ 1.0%, 1σ
	High-ash raw coal (ash content < 45%) ≤ 2.0%, 1σ
Optional part	4~20mA Analog output module

4. Product Features

- Non-radioactive: The instrument doesn't generate any high energy ray, which is easy for management, safe and reliable;
- Real time, online measurement: Gives out measuring result timely, guiding production in real-time;
- Full section measurement: High sampling representativeness, the results are stable, reliable and with high credibility;
- Static calibration: The process of calibration is simple, easy for sampling, not much workload;
- Strong adaptability of coal type: It can select special mathematical physical model according to the characteristic ray of different coal type, so that the instrument can have better adaptability of coal type change;
- Simple installation, not much workload for maintenance.

5. Product Applications

It can be used in the measurement of coming coal in power plant, raw coal in coal dressing plant and coal into furnace in coal washing plant.

Ash Moisture Analyzer

1. Product Overview

Ash Moisture Analyzer (AMA-N) is a safe and reliable online analytical instrument with distinguished performance. It can be applied to the real-time online measurement on ash content in coal. Thus, the instrument contains no radioactive substance itself, it doesn't emit radioactive ray and is radiationless, safe and reliable. It can give analysis result in real-time and instruct production.



2. Product Principles

AMA-N measures ash content through the ray emitted by the natural radioactive material exists within coal and measures moisture through microwave transmission method.

3. Product Features

- Non-radioactive: The instrument doesn't generate any high energy ray, which doesn't have radioactive security problems, safe and reliable;
- Real time, online measurement: Gives out measuring result timely, guiding production in real time;
- Full section measurement: High sampling representativeness, the results are stable, reliable and with high credibility;
- Static calibration: The process of static calibration is simple, easy for sampling, not much workload;
- Strong adaptability: It can select special mathematical physical model according to the characteristic ray of different coal types;
- Doesn't influenced by the steel chord in belt;
- Simple installation, not much workload for maintenance and even hardly need maintenance.

4. Product Parameters

Lifetime	≥10	
Weight	≤2.5t	
Size	Length: 4000mm, width: belt support width+400mm, height: belt support height+600mm	
Power source	Input voltage: AC220±2V, 50±1Hz. Power consumption electric power: 2000W	
Protection level	IEC IP65	
Communication interface	Ethernet /Modbus, RS232/485/Modbus, 4~20mA analog (optional)	
Data output	Ash content value, moisture value and calorific value	
Measuring accuracy	Ash content	Clean coal (ash content<15%) ≤0.5%, 1σ
		Low-ash raw coal (ash content<25%) ≤1.0%, 1σ
		High-ash raw coal (ash content<45%) ≤2.0%, 1σ
	Moisture	5%~10% ≤0.5%, 1σ
		10%~20% ≤1.5%, 1σ
		Higher than 20% ≤2.0%, 1σ
Calorific value	Clean coal (ash content<15%) ≤100kcal/Kg, 1σ	
	Low-ash raw coal (ash content<25%) ≤150kcal/Kg, 1σ	
	High-ash raw coal (ash content<45%) ≤200kcal/Kg, 1σ	
Optional part	4~20mA Analog output module	

5. Product Application

It can be used in the measurement of coming coal in power plant, raw coal in coal dressing plant and coal into furnace in coal washing plant.

Ash Moisture Analyzer

1. Produce Overview

The Ash Moisture Analyzer (AMA-D) independently developed by DFMC is directly installed on the coal conveyor belt and directly performs online detection of the whole coal flow, avoiding the problem of poor sampling representativeness. It can be widely used in coal mines, thermal power plants, coal washery, coal blending plants and coal wharfs for online detection, and can also be used for automatic adjustment and control of the production process in coal preparation and coal blending processes.



2. Product Principles

- Ash measured by dual energy γ -ray transmission
- Moisture measured by microwave transmission
- Calorific value calculated by ash & moisture value

3. Product Parameters

■ Accuracy

Clean coal $\leq 0.5\%$, 1σ

Raw coal with low ash content $\leq 1.0\%$, 1σ

Raw coal with high ash content $\leq 2.0\%$, 1σ

■ Accuracy of moisture measurement

5%~10% $\leq 0.5\%$, 1σ

10%~20% $\leq 1.5\%$, 1σ

More than 20% $\leq 2.0\%$, 1σ

■ Calorific value reference accuracy

(specific accuracy is given based on site conditions)

Clean coal $\leq 100\text{kcal/Kg}$, 1σ

Raw coal with low ash content $\leq 150\text{kcal/Kg}$, 1σ

Raw coal with high ash content $\leq 200\text{kcal/Kg}$, 1σ

4. Product Features

- Real-time analysis: The detection of the coal passing through the belt is totally real-time. The analyzer can give the instantaneous value and average of coal ash within any period according to the needs.
- Representative measurement result: The analyzer analyzes all the coal passing through the belt and overcomes the shortcomings of poor representativeness of the results of traditional assays, which only takes small portions for analysis.
- Adaptability: The analyzer uses the principle that signals can penetrate matter to achieve non-contact measurement. Customize best proposal according to the site condition, all key parts are designed independently to ensure stable and reliable operation.

5. Product Application

AMA-D can be widely used in coal mines, coal washery, coal blending, coking plant, coal-fired power plants, steelworks, coal wharfs, etc. for online measurement; it can also be used for coal preparation, coal blending process to automatically adjust and control the production process.

Ash Moisture Analyzer

1. Product Overview

Ash Moisture Analyzer (AMA-D) is an analytical instrument applied in coal industry site which measures the ash and moisture content in the initial-processing coal sample rapidly and accurately. The instrument has several characteristics, like rapid measurement, good representativeness and easy operation; it fits the field which has higher requirements for sample results timeliness well.



2. Product Principles

- Ash measured by dual energy γ -ray transmission
- Moisture measured by microwave transmission
- Calorific value calculated by ash & moisture value

3. Product Parameters

■ Ash content measuring accuracy

Clean coal	$\leq 0.5\%$, 1σ
Low-ash raw coal	$\leq 1.0\%$, 1σ
High-ash raw coal	$\leq 1.5\%$, 1σ

■ Moisture measuring accuracy

5%~10%	$\leq 0.5\%$, 1σ
10%~20%	$\leq 1.5\%$, 1σ
Higher than 20%	$\leq 2.0\%$, 1σ

■ Calorific value referential accuracy (concrete accuracy will be given according to site conditions)

Clean coal	$\leq 100\text{kcal/Kg}$, 1σ
Low-ash raw coal	$\leq 150\text{kcal/Kg}$, 1σ
High-ash raw coal	$\leq 200\text{kcal/Kg}$, 1σ

■ Measurement stability

Measure a standard block continuously for 24 hours, the deviation of any "ten-minute ash content" measurement value from the average value is less than 0.5%;

■ Sample measurement capability

Maximum weight of single sample: 20Kg; maximum particle size of sample: 13mm

■ Sample measurement time

The measurement time of a single sample is $\leq 10\text{min}$, and the sample measurement time can be selected according to the needs of 200s, 400s, 600s and so on.

■ Working power

Voltage: 220V, 50Hz; Power: 2000VA; Others: The equipment is equipped with an independent power conditioner

■ Working environment

On-site ambient temperature range: 0-45°C

On-site environmental humidity range: $\leq 95\%$, non-condensing

■ Radiation safety

Dose equivalent rate at 5cm from the instrument surface is $\leq 2.5\mu\text{ Sv/h}$, and that at 1m from the instrument is $\leq 0.25\mu\text{ Sv/h}$. It has no limitation on personnel range of activity. Normal use of this instrument will not cause any damage to the operators.

4. Product Features

- Fast analysis, high measurement accuracy, and representative results.
- Integrated design, automatic control process, and easy operation.
- Ash analysis using advanced multi-channel analysis technology, high-precision measurement, which reduces the effect of materials and site on measurement.
- Easy to operate, flexible and intuitional.
- The measurement results can be printed to ensure the authenticity of the data.

5. Product Applications

- Rapid detection of ash and moisture in power plant incoming coal and coal into furnace.
- Rapid detection of coal ash and moisture in steel and metallurgy, chemical and other industries.

Microwave Moisture Analyzer

1. Product Overview

Microwave Moisture Analyzer (MA) is a new kind of non-contact online moisture detection equipment, which can accurately measure the moisture content variation of the material.

MA I is mainly used for real-time online moisture detection of bulk materials transported on belt.

MA II is a kind of online measuring equipment for the moisture content of the materials in boxes, which is suitable for the real-time online moisture detection of the materials in boxes transported by belt or roller.

MA III can be designed to meet the requirements of different process detection through different holders and can be embedded into the system equipment or integrated into the specific process flow.



MA I Microwave Moisture Analyzer



MA II Microwave Moisture Analyzer



MA III Microwave Moisture Analyzer

2. Product Principle

The moisture content in the material is calculated by detecting the power attenuation and phase shift of the microwave after passing through the material.

3. Product Features

- Non-contact measurement: without abrasion and interference, less maintenance amount.
- Measure total moisture: Penetrating material and representativeness is better.
- High anti-interference ability: without interference of environment dust, steam and vibration.
- Not affected by material color, temperature and particle size.
- Rapid and real-time measurement results: the sampling rate can reach to the microsecond level.
- Wide range of applications: almost all (non-conducting) substances.
- High security: Low emission energy, without radioactive nuclear sources.

4. Technical Parameters

Model	MA I	MA II	MA III
Accuracy	0.5%~1% (1 σ)	0.3% ~ 1% (1 σ)	0.5%~1% (1 σ)
Display mode of measurement result	Moisture content value (in percentage)		
Response time	≥ 1 s (settable)	Corresponding to each box	≥ 1 s (settable)
Analog output	4~20mA (one way in case of standard configuration), $\pm 0.2\%$ indication error		
Ambient temperature	-20 ~ +60 $^{\circ}$ C		
Level of Protection	IP65		
Power supply	220V AC $\pm 10\%$, 50/60Hz		
Power consumption	50W		
Display	5.7 inch 640*480 graphical dot-matrix, 65K TFT touch control LCD screen (Integrated on the host)		

5. Product Applications

MA applies to a diverse range of materials, such as online moisture detection in coal, timber, sugar, bagasse, sand, chemical products, etc non-conductive.

- Common materials: coal, fertilizer, sand, etc.
- Steel industry: sintering mixture.
- Textile industry: fiber bundles, cotton bags, etc.
- Grain: wheat, rice, grain, corn, sorghum, grain, field crop, feed, etc.
- Bio-fuels: bagasse, wood dust, wood chips, sawdust, etc.

Radar Level Meter

1. Product Overview

Radar Level Meter (LM) is one industrial online material level detection instrument, which can measure the material level in bunker or silo. The measurement is not affected by dust, noise of feeding, and airflow or temperature changes. It is the first choice of the user when there are many interference factors in the material bunker or in extreme dust condition.

2. Product Principle

FM Continuous Wave (FMCW) principle is adopted for LM.

3. Product Features

- Material level detection is more comprehensive by applying large beam angle detection technology.
- Comprehensive detecting of the material level information. (Highest, lowest, average, etc.)
- The advanced signal processing technology ensures stable and accurate measurement under the poor working conditions of dust and water vapor.
- Unique feeding interference suppression function can solve the problem of complex disturbance in the feed bin.
- Various settings are equipped with local display function, which is extremely convenient to operate.



4. Technical Parameters

- Power supply: AC: 220V (±15%) 50HZ 10W, four-wire;
DC: 24V (±25%) 8W, four-wire
- Measuring Range: EC -75m; ST-100m; AI-120m; AI-150m
- Repeatability: 0.5mm
- Resolution: 0.3mm
- Output signal: 4~20mA, one way on-off input & output
- Beam angle: 18° with 3dB as the demarcation point
- Max. adaptable change rate of materials level: 12m/min
- Process temperature: -40-65°C for general type; -40-200°C for high temperature type
- Level of Protection: IP65

5. Product Applications

1) Cement industry

Application locations: raw meal silo, raw coal bunker, raw mix station, cement silo, surge bin after homogenization, etc.

2) Mineral processing industry

Application locations: crushing surge bin, grinding & dressing bin, feeding bin, etc.

3) Coal industry

Application locations: raw coal bunker, washing coal bunker, fine coal bunker, etc.

4) Power industry

Application locations: raw coal bunker, pulverized coal bunker, limestone bunker, etc.

Neutron Ambient Dose Equivalent (rate) Meter

1. Product Overview

Neutron Ambient Dose Equivalent (rate) Meter is a portable instrument to detect the ambient dose rate of neutron. It is verified by National Institute of Metrology.



2. Product Principle

The instrument consists of two parts: detector and host computer. The detector transforms the neutron ray into a recognizable signal. Then sends it to the host computer. After being calculated and processed by the host computer, it is converted to the actual dose equivalent rate and sent to the human-machine interaction interface, so as to achieve the measurement of the dose equivalent rate.

3. Product Features

- High detection efficiency and quick response
- High accuracy and low false alarm rate
- Large energy detection range and good performance of gamma suppression
- Easy operation and complete functions
- Reasonable human-machine interface and colored touch screen
- Unique design of triangle support, easy for long-time measurement.

4. Product Parameters

- Measuring range: 0.1uSv.h-1~10mSv.h-1
- Energy range: 0.025ev~16Mev
- Inherent error: less than $\pm 20\%$
- Repeatability: less than 20%
- Suppression ability to γ ray: greater than 100:1 in 10mSv.h-1 for ^{137}Cs field
- Angle response: varies if the angle less than $\pm 25\%$ ($0^\circ \sim \pm 90^\circ$)
- Power supply: built-in charged lithium battery or external power adapter
- Continuous working hours of battery: more than 12h
- Alarm mode: Audible and visual alarm
- Protection level: IP51
- Working temperature: $-10^\circ\text{C} \sim +50^\circ\text{C}$
- Weight: 6.6kg

5. Product Applications

- Radiation leakage monitoring or radioactive material leakage detection for nuclear reactors, nuclear power and other devices.
- The inspection of import and export goods, such as being used by border, customs and so on.
- Neutron dose rate detection during the use, storage and treatment of radioactive sources, which can be used by Atomic Energy Authorities in the area under the jurisdiction.
- The detection of the dose rate in a series of products of our company, such as neutron activation, neutron water measurement, and so on.
- The detection of the neutron dose rate of other neutronray sites, such as the neutron test.



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