

IP68  SIL  ISO  CE

FRYA ELECTRIC ACTUATOR for industrial valve automation



BRIEF INTRODUCTION

Founded in 2014, Freya specializes in fluid control products and services such as valves, actuators, electric valve actuators, and electric valves. It focuses on the process industry and has long been committed to providing services to process industries such as power, steel, building materials, and water treatment to provide professional fluid control solutions. Based on the actual working conditions, through necessary on-site surveying and technical explanations, we provide customers with safe, economical and environmentally friendly selection and design, supply in strict accordance with contract requirements and guide installation and debugging, and hand over for use if standards are met. Thanks to the trust of the vast number of users, through long-term and large-scale on-site services, and the effective accumulation of technical experience, the company has an accurate understanding of the real needs and pain points of users and the market, as well as expectations for equipment manufacturers.

The company based on its own patent R & D and production of intelligent electric actuators, reliable, durable, easy to use, cost-effective and guaranteed service. Being close to users, providing full-process services, cover-all services, repair and maintenance value-added services, and escorting users' production are our differentiating advantages. Freya SD intelligent electric actuator and electric valve actuator provide a two-year warranty and lifetime free after-sales service after installation and commissioning. Technical quality and commercial credit are the two foundations on which the company relies to survive and drive the development of the company. Users feel reassured, worry-free and happy, which are the only criteria to evaluate the effectiveness of our work and demonstrate the value of our existence.

APPLICATIONS

WATER

- Water Treatment Plant
- Sewage Treatment Plant
- Drinking Water Distribution
- Seawater Desalination
- Water System Construction

Purification and distribution of drinking water as well as treatment and purification of sewage are prerequisites for the development of basic industries. Supply security is crucial for the modern water industry. Pipeline automation requires various types of valves. FRYA actuators are widely used in the construction of water systems to operate dams and sluices. The product is a multi-turn actuator with a high corrosion resistance level that ensures a long service life and low maintenance costs.

PETROLEUM AND PETROCHEMICAL

- Pipeline
- Refinery
- Pump Station
- Platform
- Tank Farm

Petroleum and petrochemicals are important basic energy sources for industry. Their extraction, processing and distribution require quite complex techniques and processes. The petroleum and petrochemical industry implements very strict regulations and standards, and FRYA meets various market requirements such as access permits and explosion-proof certification. FRYA actuators' excellent level and applicability under various harsh conditions can meet the needs of the petroleum and petrochemical industry.



POWER

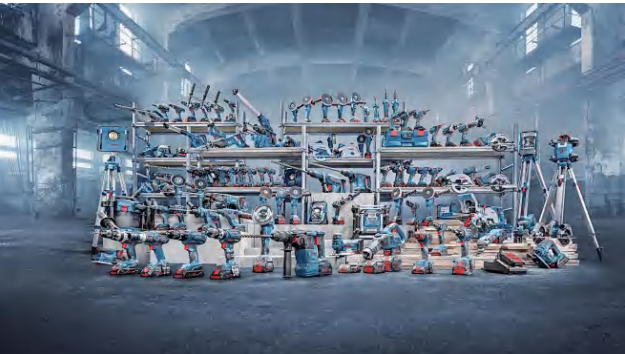
- Conventional Power Plant (Natural Gas, Oil, Coal)
- District Heating
- Hydropower
- Geothermal Power
- Combined Cycle
- Biogas Power
- Solar Power

The power plant contains multiple systems such as water and steam circuits, exhaust gas purification, boilers, etc. The control system requires that the control process can be monitored in the control room. Electric actuators are installed on valves to control the water and steam flow in the entire pipeline system. FRYA actuators can provide various valve automation interfaces adapted to the power plant control system. In power industry applications, FRYA actuators meet the applicability of any installation location requirements in terms of power supply, vibration and temperature range.

GENERAL INDUSTRY

- Conventional Power Plant (Natural Gas, Oil, Coal)
- District Heating
- Hydropower
- Geothermal Power
- Combined Cycle
- Biogas Power
- Solar Power

Any process automation requires pipes and valves. FRYA electric actuators can provide customized solutions for various industrial application requirements.



ELECTRIC ACTUATOR

In process engineering, liquids, gases and steam need to pass through pipelines. Actuators are remotely controlled from the control room to operate industrial valves, controlling the flow rate by opening and closing the valves to inhibit or release the pipeline medium.

Industrial valve automation
Modern industrial applications rely on a high degree of automation of valve systems.

The actuator controls the valve according to the operation command of the DCS. When the terminal position or the set mid-position is reached, the actuator stops and feeds back the status signal to the control system.

Electric actuator

Electric actuators are composed of motors, mechanical parts and electrical parts, and are professionally used in valve automation. Various valves such as butterfly valves, ball valves, gate valves and globe valves are operated by output torque. Manual operation of valves using handwheels is also a standard configuration of actuators. The control unit processes data to operate the actuator in the opening and closing directions. Usually, the control unit is an electrical interface with the DCS operating system, equipped with local control and integrated into the actuator.

Diverse needs

Process engineering plants with supporting pipelines and automated valves are all over the world. Not only the plants and valve types are important factors in the selection of electric actuators, but also the climatic environment of the site operation is crucial. FRYA electric actuators guarantee safe and reliable service under various extreme environmental conditions.

Product certification issued by international testing and agencies ensures that the actuators meet the customer's technical specifications during the design, manufacturing and testing stages.

FRYA electric actuators have rich experience and maintain good cooperative relations with valve factories, engineering companies and end users in power, water conservancy, petroleum and petrochemical and various industrial industries.

Reliability requirements

All on-site equipment provides reliable service throughout its entire service life, so that the entire process engineering plant is efficient, economical and safe. At the same time, we can continue to provide spare parts for these products.



FRYA ELECTRIC ACTUATOR WORKING ENVIRONMENT

Actuation mode is an important differentiating factor between valve types.

Typical examples of multi-turn valves are gate valves and globe valves. They require the actuator to output multiple turns in the full stroke from fully closed to fully open (or from fully open to fully closed).

Butterfly valves or ball valves are typically used for part-turn actuator of 90°.

Control valves are used for linear-turn operation.

Different types of valve movements require different types of actuators.

The basic principle of all actuator series is the same.

The motor drives the gear system, which transmits the torque output to the valve via a standard mechanical interface. The control unit in the actuator records the travel and monitors the torque output. When a valve end position or a preset torque switch is reached, the control unit transmits a signal to motor controls. Upon receiving this signal, the control unit integrated in the actuator stops the actuator. The control unit integrates an electrical interface compatible with the DCS, receives operating commands from the DCS and feeds back signals.

FRYA multi-turn electric actuator

The multi-turn actuator can withstand the thrust from the valve and transmit to the valve a torque that makes it rotate at least one turn. Usually, the multi-turn actuator needs to complete multiple turns, and the gate valve needs to be equipped with a rising stem. They require the multi-turn actuator to perform multiple turns of operation. Therefore, the multi-turn actuator is equipped with a hollow shaft to drive the gate valve stem.

WORKING CONDITIONS

ENCLOSURE PROTECTION

The enclosure protection level of FRYA actuators has been upgraded to IP68. IP68 means that it can be immersed in water at a depth of 8 meters for up to 96 hours. During the immersion period, 10 operations can be performed.

AMBIENT TEMPERATURE

Whether in high or low temperature environments - FRYA actuators provide stable and reliable service.

A variety of temperature range options are available to suit a variety of ambient temperature conditions.

Control method	Model	Temperature range	
		Standard	Option
On-off type Position modulating type	FRYA	−40 °C ~ +80 °C	−60 °C ~ +60 °C 0 °C ~+120 °C
	FRYA with control unit	−40 °C ~ +70 °C	−60 °C ~ +60 °C
	FRYA with control unit	−25 °C ~ +70 °C	−60 °C ~ +60 °C
Modulating type	FRYA	−40 °C ~ +60 °C	−40 °C ~ +80 °C −60 °C ~ +60 °C
	FRYA with control unit	−40 °C ~ +60 °C	−40 °C ~ +70 °C −60 °C ~ +60 °C
	FRYA with control unit	−25 °C ~ +60 °C	−25 °C ~ +70 °C −60 °C ~ +60 °C

Wider special ambient temperature requirements .

CORROSION PROTECTION

The high corrosion protection of FRYA products determines its durability level. The corrosion protection color is based on chemical pretreatment, and each component is sprayed with double layers of powder. FRYA offers various corrosion protection grades to suit different application environments. The standard color is silver gray.

Corrosion protection grade classification environmental classification		Actuator FRYA and control unit	
		Corrosion protection	Total film thickness
C1(very low)	Heated buildings with clean air	KS	140 μm
C2 (low)	Unheated buildings and rural areas with low level of pollution		
C3 (medium):	Production workshops with high humidity and moderate pollution; cities and industrial areas with moderate sulfur dioxide pollution		
C4(high)	Chemical plants and areas with moderate salinity		
C5-I (very high, industrial)	Industrial areas with permanent condensation and heavy pollution		
C5-M (very high, marine)	Coastal and offshore areas with high salinity, long-term condensation and heavy pollution		
Corrosivity classification beyond the standard			
Extreme condition (cooling tower):	Coastal and offshore areas with high salinity, permanent condensation and heavy pollution	KX KX-G (aluminium-free)	200 μm

EXPLOSION-PROOF PROTECTION

The principle of explosion-proof equipment design is that the equipment itself will not become a source of ignition in an explosive environment, nor will it produce sparks or overheat the surface.

Electric actuators	Temperature range		Explosion-proof grade
	Min.	Max.	
China-NEPSI			
Multi-turn actuator FRYAEx 07.2 – 16.2	-20°C	+60°C	Ex de IICT4/T3; Ex d IICT4/T3
Multi-turn actuator FRYAEx 07.2 – 16.2 with control unit	-20°C	+60°C	Ex de IICT4/T3; Ex d IICT4/T3
International - IECEx			
Multi-turn actuator FRYAEx 07.2 – 16.2	-60°C	+60°C	Ex de IICT4/T3 Gb; Ex d IICT4/T3 Gb
Multi-turn actuator FRYAEx 07.2 – 16.2 with control unit	-6 0°C	+60°C	Ex de IICT4/T3 Gb; Ex d IICT4/T3 Gb

OPERATING MODES – ON-OFF TYPE, POSITIONING, AND MODULATING TYPE

Select the appropriate actuator to drive the valve according to the application conditions and design.

There are three operating modes:

On-off type

The actuator drives the valve from fully open to fully closed or fully closed to fully open

Positioning modulating type

The actuator sometimes needs to drive the valve to any position (fully open, midway position and fully closed)

Modulating type

The actuator frequently drives the valve to any position between fully open and fully closed

Switching frequency and operating mode

The selection of modulating and on-off types depends on the different mechanical loads of the actuator. Therefore, the specific actuator model corresponds to the corresponding operating mode.

On-off type and positioning modulating actuators
FRYA-07.2-16.2 (S2 - 15 min/30 min)

Modulating actuators
FRYA-07.2-16.2 (S4 - 25%/50%)

STOP AT END POSITION

The actuator stops as soon as it reaches the end position. Depending on the valve type, two different stop mechanisms are available.

Limit stop

When the actuator reaches the preset stop position at any end position, the control unit stops the actuator immediately.

Torque stop

When the valve torque reaches the preset torque value, the control unit stops the actuator immediately.

For actuators without integrated control unit, the stop mode must be pre-set in the external control unit. If the actuator is equipped with an integrated control unit, the stop mode can be set in the control unit. The stop mode can be set separately for each end position.

PROTECTION FUNCTION

Overload protection for valves

If over torque occurs during valve operation, such as an object stuck in the valve, the control unit will immediately stop the actuator to protect the valve.

Motor overheat protection

The motor coil of the FRYA actuator is embedded with a thermal switch or thermistor. The fault signal is integrated into the control unit to better protect the motor coil from overheating.

Since the thermal switch or thermistor can directly measure the temperature rise of the motor coil, it can provide better protection than the thermal overload relay.

Basic functions

On-off control

On-off control is the most typical control mode. During operation, the control commands in the opening and closing directions and the feedback signals of the opening and closing in positions can usually meet customer requirements.

Automatic stop is achieved through limit stop or torque stop.

Setpoint control

The control unit receives a control signal from the host DCS system, such as a 0/4 – 20 mA signal. The positioner integrated in the control unit compares this signal with the current valve position and controls the actuator as required until the actual value approaches the setpoint.

The valve position signal is transmitted to the DCS system.

Control modes

FRYA actuators can be integrated into any automation system. In the product selection stage, it is best to choose an actuator with an integrated control unit, which can save a lot of project planning time, installation time and the documents required for selecting external control devices. Another advantage of configuring an integrated control unit is that it is easier to debug.

External control

All actuator signals, such as limit switch signals, torque switch signals, motor overheat protection and valve position, can be transmitted to the external control device for further processing. When designing the control logic architecture, it is necessary to fully consider the necessary protection mechanisms and minimize the delay time.

The contactor device used to control the operation of the motor is installed in the external control device and connected to the actuator through a cable.

When a local control operation interface is required, the local control operation interface should be installed near the actuator and integrated with the external control device.

Integrated control

When the actuator is powered on, the actuator with integrated control unit can be operated by the local control operating element. The actuator can be set up on site without connecting to the DCS system. Only the transmission and exchange of operation commands and feedback signals are required between the control system and the actuator. The on-off control of the motor is completed instantly in the device.

Fieldbus

In a fieldbus system, all actuators can be connected to the DCS system via a two-wire cable. All operating commands and feedback signals between the actuator and the DCS system can be transmitted via the cable.

The use of bus cable connection can save a lot of space in the control cabinet, and it is more obvious that the connection of traditional input and output signal lines is outdated. The use of two-wire cables simplifies the commissioning phase and greatly reduces the cost of cables in long-distance fields.

Another major advantage of fieldbus technology is the transmission of preventive maintenance and diagnostic information to the control room. Therefore, fieldbus technology integrates all fieldbus devices into the asset management system to support safety protection measures for field device utilization.

FRYA actuators can be applied to various common standard types of fieldbus systems in process automation.

The actuator can be adapted to the specific application requirements by setting and collecting a large number of parameters. The monitoring and diagnostic functions enable the acquisition of actuator status signals and operating parameter signals.

For the control unit, the clearly structured and intuitive user interface makes it easier to store and retrieve detailed actuator data. All parameter settings of the device do not require any additional setting tools.

The LCD display is designed according to the user's visual and operating habits, displayed in plain text, and can be freely configured by the user in multiple languages.

Password protection

The password protection is an important safety feature. This feature effectively prevents unauthorized users from modifying important device parameters.

1 LCD display

The LCD display shows text information, graphic elements and actuator characteristics.

2 Indicator lights

Indicator lights are used to display actuator status information and can be freely programmed and configured according to customer requirements. Even from a distance, the LEDs are still clearly identifiable.

3 Selection of control mode

The selector switch LOCAL-OFF-REMOTE installed on the local operating device can be used to set the remote operation (remote control) or local operation (local control) mode.

4 Operation and parameter setting

Depending on the selector switch position, the LOCAL-OFF-REMOTE button can be used to start electric actuator operation, request status signals or navigate through the menu.

5 Display of valve position

Even from a distance, the valve position is clearly visible on the large LCD display.

6 Display of operating commands/setpoints

The operating commands and setpoints issued by the DCS system can be displayed on the LCDs.

7 Diagnostic/monitoring display

During operation of the device, environmental conditions and operating status are continuously monitored. If the permissible range is exceeded, the control unit generates a warning signal.

8 Main menu

The main menu displays the actuator status and operating data and can modify operating parameters.

9 Non-intrusive settings

The end position and tripping torque can be set on the LCD display without opening the actuator.

10 Fault Display

Once a fault occurs, the LCD display will immediately turn red and the cause of the fault can be checked through the LCDs.

Actuators should have a long service life, long maintenance intervals and simple maintenance procedures. These factors are of great significance for reducing plant operating costs.

Maintenance on demand

Various parameters such as running time, switching frequency, torque, ambient temperature-affect different actuators in different ways, so a separate maintenance plan is required for each actuator. These factors are continuously recorded and evaluated in four maintenance categories: seals, grease, contactors and gear mechanisms. When a limit value is reached, the actuator sends a corresponding maintenance demand signal.

Out of specification - Pre-correct potential failures before they occur

The operator receives early warning signals of potential problems. The early warning signals reveal the range of operating conditions that the actuator is in, such as excessive ambient temperature, which may lead to frequent or continuous actuator failures.

Plant management

Repair measures can be completed by the service staff on site or by FRYA technical service staff, while extending the operating cycle of the equipment through appropriate repair and maintenance work.

The service staff provide maintenance recommendations and complete all required operations as instructed by the signals.

Event report/operating data recording with time stamp

Setting procedures, switching procedures, alarm signals, faults and running times are recorded in an event report with time stamp.

Valve diagnostics

The control unit records torque characteristics at different times. By comparing the data sets, changes in the valve characteristics can be evaluated.

Evaluation

The diagnostic data can be viewed through the LCD display and fieldbus.

FRYA actuators equipped with a fieldbus interface provide a standardized interface for remote diagnosis through the control room.



Out of specification

The actuator monitors itself to determine if it has deviated from the permitted application conditions. The actuator remains under control from the control room.



Failures

Due to functional failures in the actuator or peripheral equipment, the actuator may not be able to be controlled from the control room.



Maintenance needs

The actuators are still under control from the control room. The equipment is checked by professionals to avoid unexpected production downtime.



Functional check

Due to the ongoing functional check of the actuator, the actuator cannot be controlled from the control room at this particular time.

Using serial communication to control field devices and actuators in process automation is considered to be one of the most innovative ideas. Improvements in plant efficiency, such as remote parameter setting, would not be possible without fieldbus technology. FRYA actuators equipped with fieldbus interfaces have such a level of technology.

FRYA fieldbus

Various different fieldbus systems have been widely used. At a local level or in a specific field application, the accuracy of parameter setting is constantly being improved. FRYA actuators are used in various process automation control fields.

- Profbus DP
- Modbus RTU
- Foundation Fieldbus
- HART

In short, FRYA actuators have the ability to connect other sensors with binary and analog input signals to the fieldbus communication.

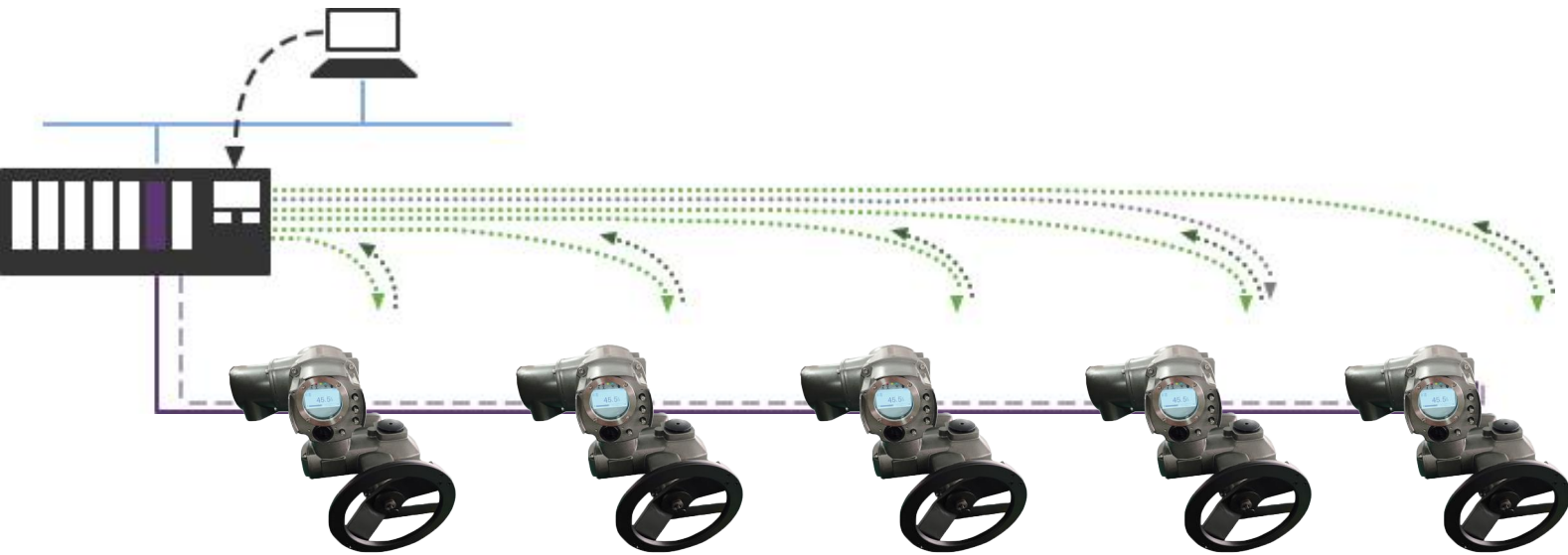
PROFIBUS

Profbus is a perfect fieldbus version. Profbus PA is used in the field of process control. Profnet is a new generation of automation bus standard based on Ethernet and Profbus DP for data transmission. It is mainly used in factories, power plants and automation equipment. Due to its simple and durable physical layer (RS-485) and different versions DP-V0 (fast cycle deterministic data exchange), DP-V1 (non-cyclic access to device parameters and diagnostic data) and DP-V2 (more functions such as time stamp or redundancy), Profbus DP is the ideal solution for modern factory automation.

- Standardized integration in DCS
- Wide range of equipment selection
- Typical application environment: power plant, sewage treatment, water treatment, tank farm

FRYA actuators with Profibus DP

- Supports Profbus DP-V0, DP-V1 and DP-V2
- High-speed data exchange
(up to 1,5 Mbit/s - corresponds to approx. 0,3 ms/actuator)
- Cable lengths up to approx. 10 km
(up to 1 200 m without repeaters between two actuators)
- Up to 126 field devices can be connected
- Option: Redundant line topology
- Option: Data transmission via fiber-optic cables
- Option: Overvoltage protection up to 4 kV



MODBUS

Compared with other fieldbus technologies, Modbus is a relatively simple but powerful fieldbus protocol. It can provide all the services required for factory automation, such as the exchange of simple binary information, analog information, device parameter information or diagnostic data.

In the field of industrial automation, similar to Profbus, simple and robust RS-485 physical links are often used.

Based on this physical link, Modbus supports multiple transmission modes, such as Modbus RTU. The Ethernet-based Modbus TCP/IP version is often deployed in vertically integrated host automation systems.

- Simple protocol
- Global promotion and application
- Communication sufficient to complete multiple simple automation tasks
- Typical application environments: water treatment and sewage treatment, pumping stations, tank farms

FRYA actuators with Modbus RTU

- Fast data exchange
(up to 115,2 kbit/s - corresponds to approx. 20 ms/actuator)
- Cable lengths up to approx. 10 km
(up to 1 200 m without repeater between two actuators)
- Up to 247 field devices can be connected
- Option: Redundant line topology
- Option: Data transmission via fiber-optic cable
- Option: Overvoltage protection up to 4 kV

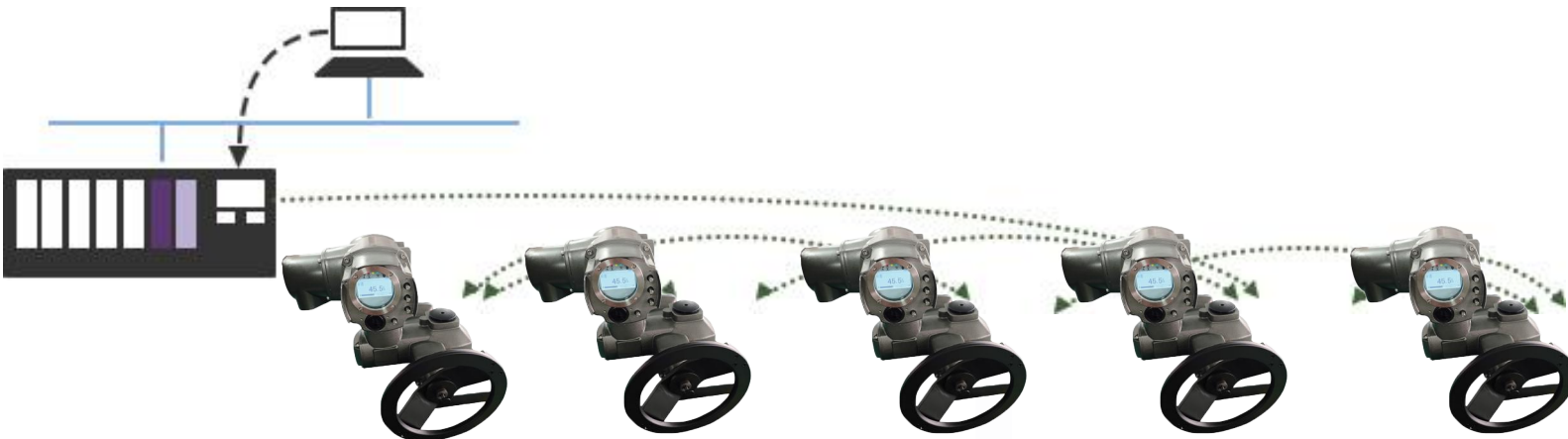
FOUNDATION FIELDBUS

Foundation Fieldbus (FF) is designed specifically for process automation systems. The transmission physical layer of the FF H1 protocol specifies the data transmission architecture and a simple field device power supply architecture. The transmission medium can use the same cable. FF H1 can support a variety of topologies. By combining with a junction box or segment barrier, the flexibility of cable installation is greatly improved. In addition to the traditional linear and tree topologies, FF H1 also supports point-to-point or other structures such as connecting multiple field devices through a bus with multiple independent branches.

The Foundation Fieldbus data interface is based on standard function modules and can coordinate FF data communication by configuring a link active scheduler within the segment to achieve direct interactive communication between devices within the segment.

FRYA actuators with FOUNDATION Fieldbus

- Data exchange value 31.25 kbit/s, cycle time 1 s
- Cable length up to approx. 9.5 km
(up to 1 900 m without repeater between two actuators)
- Up to 240 field devices can be connected, typically 12 to 16 field devices can be used
- Integration into DCS via DD or FDT
- Optional: Overvoltage protection up to 4 kV



HART uses 4 – 20 mA standard signals to complete analog data transmission. HART communication is to superimpose digital signals on analog signals. Its advantage is that the HART protocol realizes the synchronous transmission of digital signals and analog signals. That is, digital signal communication is completed in the existing 4 – 20 mA analog system, and process parameters and diagnostic data can be easily read from field devices at any time.

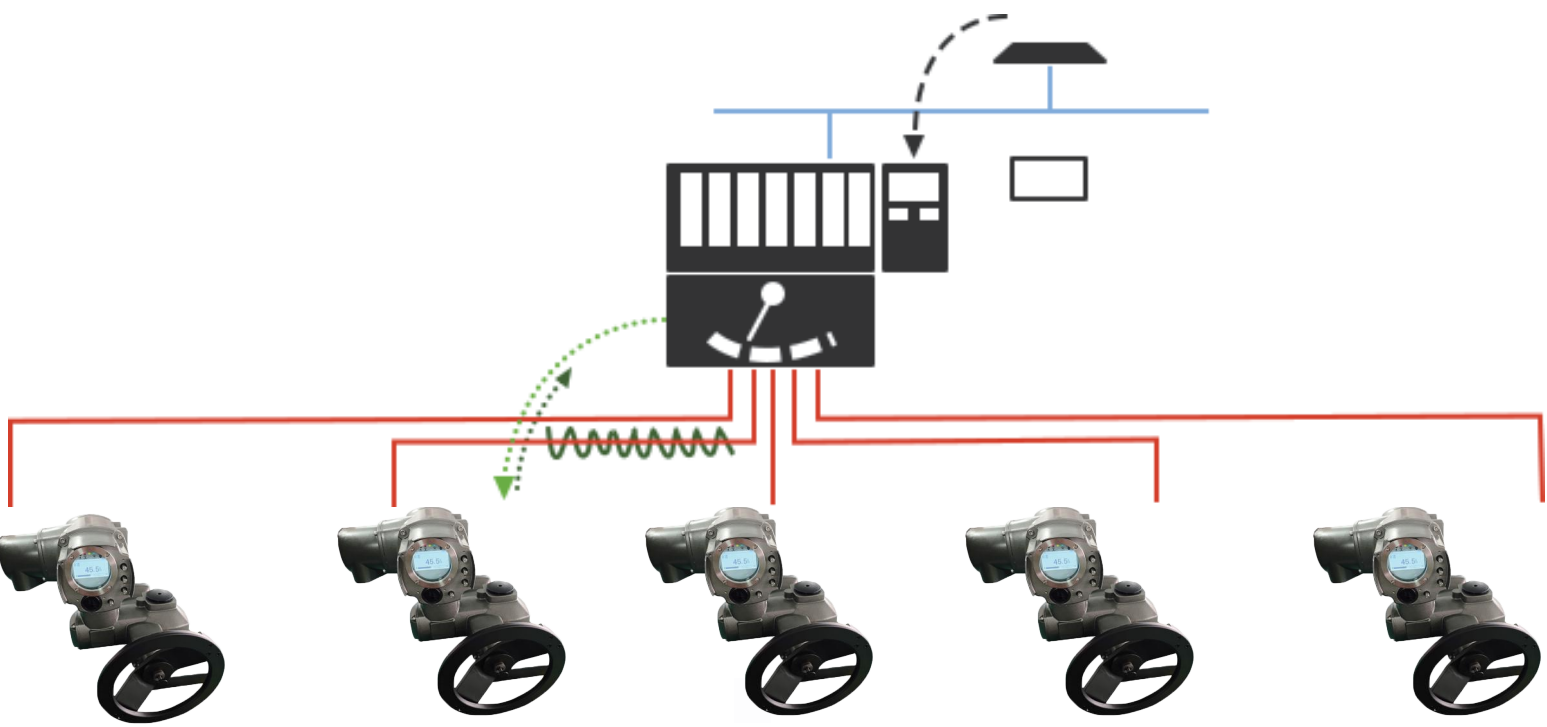
- HART is designed based on the master-slave principle and provides a variety of instructions for data transmission. The traditional 4 – 20 mA point-to-point wiring method is usually used.
- > Global promotion and application
 - > Standardized integration within DCS
 - > Wide range of equipment selection

- FRYA actuators with HART protocol
- 4 – 20 mA HART analog signal for transmission of setpoint signal or alternatively actual position signal
 - Transmission of process parameters and diagnostic data via HART digital communication
 - Digital communication of approx. 500 ms per actuator
 - Cable length up to approx. 3 km

FIELDBUS CENTRALLY MANAGES FIELD DEVICES EFFECTIVELY

Fieldbus centrally manages field devices effectively

In addition to the basic necessary functions, such as device configuration, device replacement, fault analysis, device diagnosis or related document management, field devices also have diagnostic functions and a large number of special application functions to adapt the device to the requirements of process control and environmental conditions. When the device is configured with a certain functional module, such as the Profbus DP-V1 protocol, the data exchange related to these functions can be completed directly between the control station and the field device through the fieldbus.



FRYA ON-OFF TYPE MULTI-TURN ACTUATOR

The following data apply to actuators with three-phase AC motors, on-off type duty cycle is S2 - 15 min

Model	Output speed rpm	Setting range of tripping torque Nm	Max. number of starts 1/h	Output flange ISO5210
FRYA-07.2	4-180	10-30	60	F07 or F10
FRYA-07.6	4-180	20-60	60	F07 or F10
FRYA-10.2	4-180	40-120	60	F10
FRYA-14.2	4-180	100-250	60	F14
FRYA-14.6	4-180	200-500	60	F16
FRYA-16.2	4-180	400-1000	60	F16

The following data apply to actuators with three-phase AC motors, modulating type duty cycle is S4 - 25%

Model	Output speed rpm	Setting range of tripping torque Nm	Max. torque Nm	Max. number of starts 1/h	Output flange ISO5210
FRYAR-07.2	4-90	15-30	15	1500	F07 or F10
FRYAR-07.6	4-90	30-60	30	1500	F07 or F10
FRYAR-10.2	4-90	60-120	60	1500	F10
FRYAR-14.2	4-90	120-250	120	1200	F14
FRYAR-14.6	4-90	250-500	200	1200	F14
FRYAR-16.2	4-90	500-1000	400	900	F16

CONTROL UNIT

	Turns/stroke	
	Conventional type control unit	Highly intelligent type control unit
Standard	2-500	1-500
Option	2-5000	10-500

HIGHLY INTELLIGENT CONTROL UNIT

When using a high-intelligence control unit, the end position, valve operating position, torque, housing temperature and vibration are recorded in digital form and transmitted to the integrated control unit. The control unit processes all signals internally and gives corresponding displays through the respective communication interfaces.

The conversion of mechanical parameters to electronic signals is contactless, thus reducing losses. High-intelligence control unit are a prerequisite for non-intrusive setting of actuators.

CONVENTIONAL CONTROL UNIT

Conventional control unit

If an integrated control unit is used, binary and analog signals are processed internally in conventional contro unit. For actuators without an integrated control unit, the signals are transmitted via the electrical connection interface. Therefore, the following information on the technical parameters of contacts and remote signal transmission is very important.

Limit/torque switch

Type		
	Application/description	Contact type
Single switch	Standard	One NC contact and one NO contact
Tandem switches (option)	Used to switch two different voltages. This switch has two electrically isolated switches housed in a common sealed housing. The two switches operate together; one is dominant and the other is used for signaling.	Two NC contacts and two NO contacts
Triple switches (option)	Used to switch three different voltages. The switch includes a single and a tandem switch.	Three NC contacts and three NO contacts

Rated power	
Silver plated contacts	
Min. voltage	24 V AC/DC
Max. voltage	250 V AC/DC
Min. current	20mA
Max. AC current	5 A/250 V (resistive load) 3 A/250 V (inductive load, cos j = 0,6)
Max. DC current	0.4 A/250 V (resistive load) 0.03 A/250 V (inductive load, L/R = 3 μs) 7 A/30 V (resistive load) 5 A/30 V (inductive load, L/R = 3 μs)

Flashing switch for operation indication

Rated power	
Silver plated contacts	
Min. voltage	10 V AC/DC
Max. voltage	250 V AC/DC
Max. AC current	3 A/250 V (resistive load) 2 A/250 V (inductive load, cos j ≈ 0,8)
Max. DC current	0.25 A at 250 V (resistive load)

CONVENTIONAL CONTROL UNIT(CONTINUED)

Remote position transmitter

On-off type for precision potentiometer		
	Single	Tandem
Linearity	≤ 1 %	≤ 1 %
Power	1.5 W	1.5 W
Resistance (standard)	0.2 kΩ	0.2/0.2 kΩ
Resistor (optional) Other resistor types required	0.1 kΩ, 0.5 kΩ, 1.0 kΩ, 2.0 kΩ, 5.0 kΩ	0.5/0.5 kΩ, 1.0/1.0 kΩ, 5.0/5.0 kΩ, 0.1/5.0 kΩ, 0.2/5.0 kΩ
Max. current of moving contact	30 mA	30 mA
Lifetime	100,000 cycles	100,000 cycles

Precision film potentiometer for modulating type		
	Single	Tandem
Linearity	≤ 1 %	≤ 1 %
Power	0.5 W	1.5 W
Resistor (optional) Other resistor types required	1.0 kΩ or 5 kΩ	1.0/5.0 kΩ or 5.0/5.0 kΩ
Max. current of moving contact	0.1mA	
Lifetime	5m modulating steps	100,000 cycles
Max. ambient temperature	+90 °C	+90 °C

HANDWHEEL ACTIVATION

Rated power of micro switch transmitting handwheel activation signal	
Silver plated contacts	
Min. voltage	12 V DC
Max. voltage	250 V AC
Max. AC current	3 A at 250 V (inductive load, cos j = 0,8)
Max. DC current	3 A at 12 V (resistive load)

VIBRATION RESISTANCE

The actuators are designed to withstand vibrations of up to 2 g during start-up or equipment failures in the frequency range of 10-200 Hz without fatigue. This technical data applies to FRYA actuators without integrated control unit, but without gearbox. Actuators with integrated control unit can withstand loads of up to 1 g when the above conditions are met.

FRYA actuators can also be operated without restriction in any mounting position.

POWER SUPPLY/POWER SUPPLY FREQUENCY

3-phase AC current

Voltage V	Frequency Hz
220; 230; 240; 380; 400; 415; 500; 525; 660; 690	50
440; 460; 480; 575; 600	60

1-phase AC current

Voltage V	Frequency Hz
230	50
115; 230	60

DC current

Voltage V
24; 48; 60; 110; 220

Fluctuation range of power supply voltage and frequency

· FRYA standard configuration

Power supply voltage: ±10%

Frequency: ±5%

· Optional configuration of control unit

Power supply voltage: –30%

Specially specified when selecting actuator

MOTOR

Model	3-phase AC current	1-phase AC current	DC current
FRYA 07.2-16.2	S2 - 15 min, S2 - 30 min	S2 - 15 min	S2 - 15 min
FRYAR07.2-16.2	S4 - 25%, S4 - 50%	S4 - 25%	-

Motor insulation class

	Insulation class
3-phase AC motor	F
1-phase AC motor	F
DC motor	F

Motor protection ratings
Thermistors are standard for motor protection. When using an integral control unit, the motor protection signals are processed internally. This also applies to the optional PTC thermistor. For actuators without integral control units, the signals must be transferred to an external control system for processing
Special motors For special requirements, the actuators can be equipped with special motors, such as brake motors or two-speed motors.

Thermal switch rating	
1-phase AC (250VAC)	Switch rating max.
cos j = 1	2.5 A
cos j = 0.6	1.6 A
DC voltage	Switch rating max.
60 V	1A
42V	1.2A
24V	1.5A

Special motors
For special requirements, the actuators can be equipped with special motors, such as brake motors or two-speed motors.

HEATER

Heater in control unit	Actuators without integral control unit	Actuators with control unit
Heating element	Self-regulating PTC element	Resistance type heater
Voltage ranges	110 V-50 V DC/AC 24 V-48 V DC/AC 380 V-400 V AC	24 V DC/AC (internal supply)
Power	5 W-20 W	5 W

Motor heater	Actuators without integral control unit
Voltages	110-120 V AC, 220-240 V AC oder 380-400 V AC (external supply)
Power	12,5 W-25 W
Control unit heater	Actuators without integral control unit
Voltages	110-120 V AC, 220-240 V AC, 380-400 V AC
Temp.-controlled power	60 W

Multi-turn electric actuators for on-off type with 1-phase AC motor

Model	Output speed rpm		Torque range Nm		Numbers of starts	Valve attachments			Handwheel		Weight Kg
	50Hz	60Hz	Min.	Max.	Starts max. 1/h	Standard EN ISO5210	Option DIN3210	Max. φ rising stem mm	φ mm	Reduction ratio	
FRYA-07.2	4	4.8	10	30	60	F07 F10	- G0	26 34	160	11:1	21
	5.6	6.7								8:1	
	8	9.6								11:1	
	11	13								8:1	
	16	19								11:1	
	22	26								8:1	
	32	38	28	11:1							
	45	54		8:1							
	63	75		11:1							
	90	108		8:1							
	125	150		5.5:1							
	180	216		4:1							
FRYA-07.6	4	4.8	20	60	60	F07 F10	- G0	26 34	160	11:1	21
	5.6	6.7								8:1	
	8	9.6								11:1	
	11	13								8:1	28
	16	19								11:1	
	22	26								8:1	
	32	38	37	11:1							
	45	54		8:1							
	63	75		11:1							
	90	108		8:1							
	125	150		5.5:1							
	180	216		4:1							
FRYA-10.2	4	4.8	40	120	60	F10	G0	40	200	11:1	28
	5.6	6.7								8:1	
	8	9.6								11:1	
	11	13								8:1	31
	16	19								11:1	
	22	26								8:1	
	32	38	43	11:1							
	45	54		8:1							
	63	75		11:1							
	90	108		8:1							
	125	150		5.5:1							
	180	216		4:1							
FRYA-14.2	4	4.8	100	250	60	F14	G1/2	58	315	11:1	59
	5.6	6.7								8:1	
	8	9.6								11:1	
	11	13			30					8:1	61
	16	19								11:1	
	22	26								8:1	
32	38	63	11:1								
45	54		8:1								
FRYA-14.6	4		4.8	200	500	60	F14	G1/2	58	400	11:1
	5.6	6.7	8:1								
	8	9.6	11:1								
	11	13	30		8:1	66					
	16	19			11:1						
	22	26			8:1						

1. The tripping torque can be adjusted for both OPEN and CLOSED directions within the indicated torque range.
2. For actuators equipped with single-phase AC motors with built-in permanent shunt capacitors, a minimum stop time of 2.5 seconds is required before starting in the reverse direction (reversal prevention time).

Multi-turn electric actuators for on-off type with 3-phase AC motor

Model	Output speed rpm	Torque range Nm	Nominal power KW	Speed rpm	Nominal current A	Max. current A	Starting current A	Overcurrent prot. device setting A
FRYA-07.2	4	30	0.02	1400	0.4	0.3	1.1	0.3
	5.6			1400	0.4	0.4	1.1	0.4
	8			1400	0.4	0.4	1.1	0.4
	11			1400	0.4	0.5	1.1	0.5
	16			1400	0.6	0.6	2.0	0.6
	22	25	0.06	2800	0.6	0.7	2.0	0.7
	32			1400	1.0	1.0	2.5	1.0
	45			1400	1.0	1.1	2.5	1.1
	63			2800	0.8	1.3	4.6	1.3
	90			2800	0.8	1.4	4.6	1.4
FRYA-07.6	125	60	0.30	2800	0.9	1.6	4.6	1.6
	180			2800	0.9	1.7	4.6	1.7
	4			1400	0.4	0.4	1.1	0.4
	5.6			1400	0.4	0.5	1.1	0.5
	8			1400	0.6	0.7	1.7	0.7
	11	50	0.12	1400	0.6	0.7	1.7	0.7
	16			2800	0.7	0.9	3.2	0.9
	22			2800	0.7	1.1	3.2	1.1
	32			1400	1.7	2.0	4.8	2.0
	45			1400	1.7	2.1	4.8	2.1
FRYA-10.2	63	120	0.40	2800	1.7	2.4	9.5	2.4
	90			2800	1.7	2.6	9.5	2.6
	125			2800	1.8	3.2	9.5	3.2
	180			2800	1.8	3.4	9.5	3.4
	4	100	0.50	1400	0.5	0.6	2.1	0.6
	5.6			1400	0.5	0.6	2.1	0.6
	8			1400	1.1	1.2	3.2	1.2
	11			1400	1.1	1.3	3.2	1.3
	16			2800	1.4	1.6	4.7	1.6
FRYA-14.2	22	250	0.25	2800	1.4	1.9	4.7	1.9
	32			1400	2.6	2.7	8.9	2.7
	45			1400	2.6	3.2	8.9	3.2
	63			2800	3.2	3.8	17	3.8
	90			2800	3.2	4.2	17	4.2
	125	200	0.70	2800	3.7	5.5	17	5.5
	180			2800	3.7	5.8	17	5.8
	4			1400	0.5	0.8	2.9	0.8
	5.6			1400	0.5	1.1	2.9	1.1
	8			1400	1.1	1.7	5.5	1.7
FRYA-14.6	11	500	0.45	1400	1.1	1.8	5.5	1.8
	16			2800	1.6	3.2	9.5	3.2
	22			2800	1.6	3.7	9.5	3.7
	32			1400	2.6	4.2	17	4.2
	45			1400	2.6	5.3	17	5.3
	63	400	1.40	2800	4.9	7.4	40	7.4
	90			2800	4.9	9.5	40	9.5
	125			2800	5.6	12	50	12
	180			2800	5.6	12	50	12
	4	1000	0.20	1400	0.9	0.9	5.5	0.9
FRYA-16.2	5.6			1400	0.9	1.1	5.5	1.1
	8			1400	1.8	3.2	9.8	3.2
	11			1400	1.8	3.7	9.8	3.7
	16			2800	3.8	5.3	19	5.3
	22			2800	3.8	5.8	19	5.8
	32	800	1.60	1400	5.6	7.9	40	7.9
	45			1400	5.6	9.5	40	9.5
	63			2800	9.5	14	61	14
	90			2800	9.5	17	61	17
	125			2800	10	22	61	19
	180			2800	10	23	61	19
FRYA-16.2	4	1000	0.40	1400	1.5	2.8	11	2.8
	5.6			1400	1.5	3.1	11	3.1
	8			1400	2.9	5.3	23	5.3
	11			1400	2.9	5.8	23	5.8
	16			2800	5.9	9.5	42	9.5
	22	800	1.50	2800	5.9	11	42	11
	32			1400	8.9	14	63	14
	45			1400	8.9	17	63	17
	63			2800	12	26	120	26
	90			2800	12	32	120	26
FRYA-16.2	125	800	6.00	2800	13	37	120	26
	180			2800	13	47	120	26
				2800	13	47	120	26

