Vtek™ Controls

VSM Series Multi-turn Electric Actuator

Advanced technology
Safe and reliable design
Supports multiple control modes
Supports multi communication agreement of field bus, such as PROFIBUS, FF, MODBUS, and etc

VSM Introduction

VSM series multi-turn intelligent electric actuator is a new generation product. Based on the design idea of safety and reliability, it integrates the advanced technology of actuators development and processed two designs with integrated and separated according to the product applications. It can meet the frequent adjust requirement as well as the discontinuous-control, and is widely used in power station, petrochemical, petroleum, chemical, metallurgy, steel, oil pipeline and water treatment and other automation fields.

Manufacturing experience

Relying on 20 years of on-site experience with actuators, it was found that more than 70% of circuit board failures are caused by capacitor failures.

User-friendly design

- Terminal cover can be rotated 90°.
- The wiring direction of the actuator is not restricted by the cable position.
- Ensure that the cable entry port can always be downward to prevent the intrusion of rain, snow and water.

Double sealing structure

During the engineering installation and debugging stage, even if the terminal cover of the actuator is open for a long time, due to the existence of the second-level seal between the terminal plate and the shell, dust, moisture, etc. are prevented from entering the inside of the motor and electrical housing, protecting the motor and control circuit from corrosion.

Painting

The outer surface of the VSM series electric actuator is sprayed with outdoor high-gloss plastic powder, which can adapt to most application environments. If there are special painting requirements, it can be specially customized after providing detailed requirements.

Intelligent valve monitoring system

Add valve monitoring test function for safety shut-off valve.

- Supports all final component inspections, up to SIL4 level
- PST functionality
- Support online monitoring
- Support machine learning

Intelligent pipe break protection system

Used in long-distance natural gas pipeline breakage protection valves to provide safer and more reasonable protection for pipeline users

- It can be modified to support various types of gas-liquid linkage actuators.
- Support machine learning.

ST-RING fieldbus control system

A control system that facilitates professional and unified management of actuators by customers while reducing the cost of cable laying.

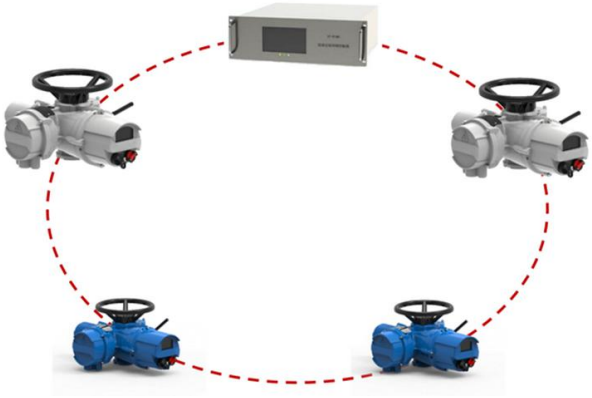
- Two-wire fieldbus system
- Intelligent terminal
- Supports a variety of actuator devices
- The maximum number of supported devices is 240 devices/each host
- The maximum distance of the loop is 20Km (no relay)

Valve PST test limit switch

Compact, cost-effective pneumatic and hydraulic valve PST partial stroke test product.

Compare conventional mechanical products:

- Small, compact structure
- Easy to modify, low investment
- Rich functions, supporting various PST signal control and feedback



Field Bus Control System

In addition to support conventional control methods, Vtek's VSM series actuators also support seamless connection with a variety of field bus control systems that meet international standards, such as PROFIBUS, FF, MODBUS, HART, etc. Vtek's VSM series actuators can support EDDL and FDT/DTM device descriptions as well as a variety of bus redundancy methods.

Vtek's advanced ST-RING controllers support a ring network with up to 250 actuators, enabling independent remote control and diagnosis of actuators without DCS/ PLCS.

- Field bus control with two-wire system
- Intelligent terminal
- Support a variety of actuator device
- Support a maximum of 250 devices/per host
- The maximum distance of the loop is 20Km (without repeater)
- Compatible with smart plus detectors
- Response delay 50ms

VSM Features

The connection parts adopt double sealing structure to block the entry of water and gas effectively.

Support PROFIBUS, FF, MODBUS, HART, etc and multiple redundant control modes.

The terminal port can be rotated by 90°

Remote and local mode selection knob; Local valve opening and closing knobs

The LED displays the full open and closed position of the valve, which can be seen from a distance.

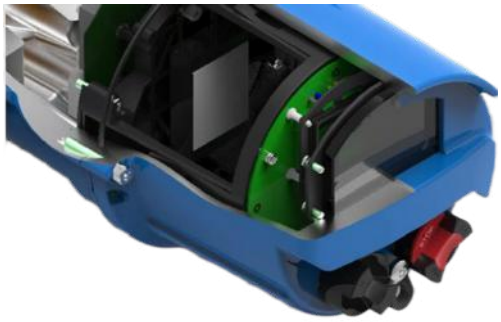
Enclosure protection rating IP68

Explosion-proof rating dIICT4

Three phase power supply can be used, please consult factory for details.

The back up battery can also display the valve position when there is no main power supply.

- Adoption of large-scale digital integrated chip, in possession of powerful function and high precision level.
- The connection between the wiring end cover and the box adopt fixed bolts, and the nylon lanyard is collected between the end cover and the box, so it is convenient for the wiring operation of field staff.
- The graphic dot-matrix LCD can display words, digital, graphics, actuator torque, valve position, limit setting and other working status and alarm. It also support Chinese, English and other languages.
- The accuracy of valve positioning is up to level one by adopting displacement sensor with absolute encoder and no need of battery memory.
- The manual mechanism adopts new double seal design, which solves the problem of lubricating oil leakage in the hand wheel parts commonly existed in the electric actuators.
- Connection mode of plug type or sunflower disk type for easy and fast maintenance Menu operation interface for better learning and understanding.
- Using the most advanced magnetic electric absolute encoder, the output shaft drives the absolute encoder to rotate, and the encoded signal is sent to the main control chip to calculate the valve position value, which is always correct and will not be affected by the power loss or interference of the absolute encoder.
- Torque measurement-Achievement of continuous measurement of output torque by establishing mathematical model through detecting data of current, voltage, magnetic flux , etc and a adoption of advanced algorithm.



Non-intrusive design

Non-intrusive design concept:

- The local/remote selection knob and local operation knob use magnetic steel to control the Hall sensor in the electrical housing, abandoning the traditional knob through-shaft.

- When using infrared/Bluetooth setters to set parameters, debug, and query the actuator, there is no need to open the actuator housing.

Advantages:

- Without opening the housing, the actuator is protected from dust, harmful gases and moisture in the environment.
- It can be easily debugged in the rain or in the presence of flammable gases.
- The various states of the actuator can be easily checked.

Advantages of AI machine learning

VSM series multi-turn electric actuator is based on the machine learning technology and IiOT Industrial Internet of Things (Industry 4.0), integrating advanced technology and experience in valve control, and has independent intellectual property rights related to actuator-related intelligence.

Improve usage safety

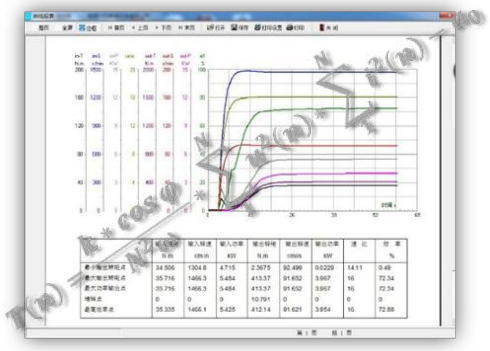
Machine learning can analyze the correct operating status of the actuator from the historical data of each operation. Once an abnormality occurs, it can provide early warning even if no failure occurs. It also can determine faults in the connection between the valve and the actuator, such as valve stem breakage, lead screw wear, etc.

Enhance the performance

Through machine learning, each product can have a unique control mechanism to improve consistency and high precision. At the same time, it can also adapt to various types of valves to improve product performance in a targeted manner.

More active and convenient human-computer interaction

Utilizing conventional communications and IioT wireless suite, users are proactively informed of product status and recommended actions through cloud services. At the same time, it is adapted to conventional mobile devices for a more convenient interactive experience.



Different settings for different types of valves

Ball valve & butterfly valve

The actuator is automatically set to limit opening/closing to prevent excessive opening and closing of the ball valve from causing damage to the valve seal.
The PST detection function is enabled by default (only for ball valves)

Gate valve

The actuator is automatically set to limit open\torque close. Torque closing the valve can avoid the phenomenon that the valve is not closed tightly.

Valve stem wear warning (Straight stroke valve)

The actuator automatically activates the wear detection function to detect the wear of the regulating valve sleeve and valve stem. When the wear upper limit is reached, an alarm signal is output to remind the customer to replace it in time.

Solid media

The actuator performs a self-lubricating function and performs "reciprocating motion" in the opening and closing directions of the valve to reduce the jamming of the valve plate by solid media.

Regulation application

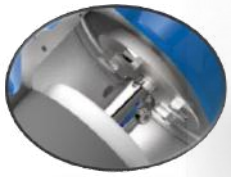
Improve absolute accuracy, monitor the valve's own inertia, movement speed and torque, etc., and improve accuracy through special algorithms.

VSM Functions

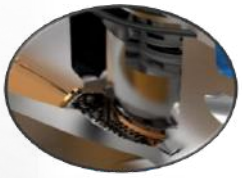
Simple and reliable structure, the optimized transmission chain parameter design for high transmission efficiency, the worm adopts angular contact bearing to improve the axial load capacity.

ISO5210 and other international standard flanges, special flanges can be customized.

New design of motor installation structure for easy disassembly and high reliability.

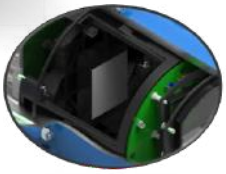


Oil bath worm gear improves accuracy and good for heat dissipation.

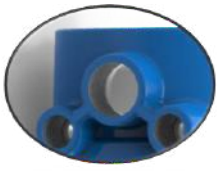


The connection parts adopt double sealing structure to block the entry of water and gas effectively.

The electric part adopts shock-proof structure with suspension type.



Cable inlet port can be customized.



Knob anti-collision and non-intrusive design

Protection function

- Torque protection
- Valve position limit protection
- Automatic phase sequence adjustment
- Instantaneous reversal protection
- Power supply phase loss protection
- Action when the valve is stuck
- Overheat protection
- Electrical protection

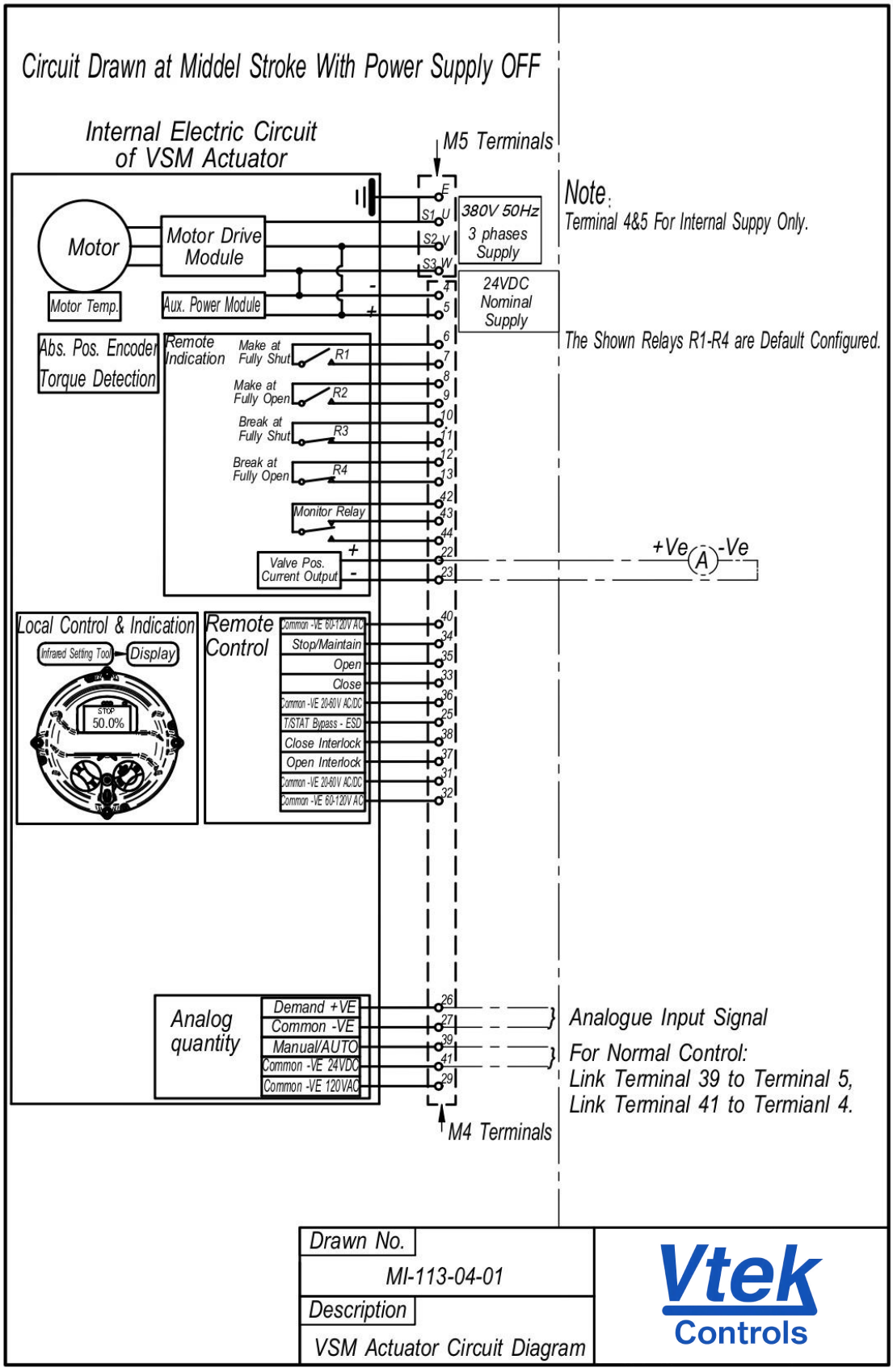
Configuration alarm

- Valve position fully open\fully closed feedback
- Over torque alarm
- ESD trigger alarm
- Motor temperature alarm
- Power phase loss alarm
- Remote signal loss alarm
- Operation knob status
- PST success signal

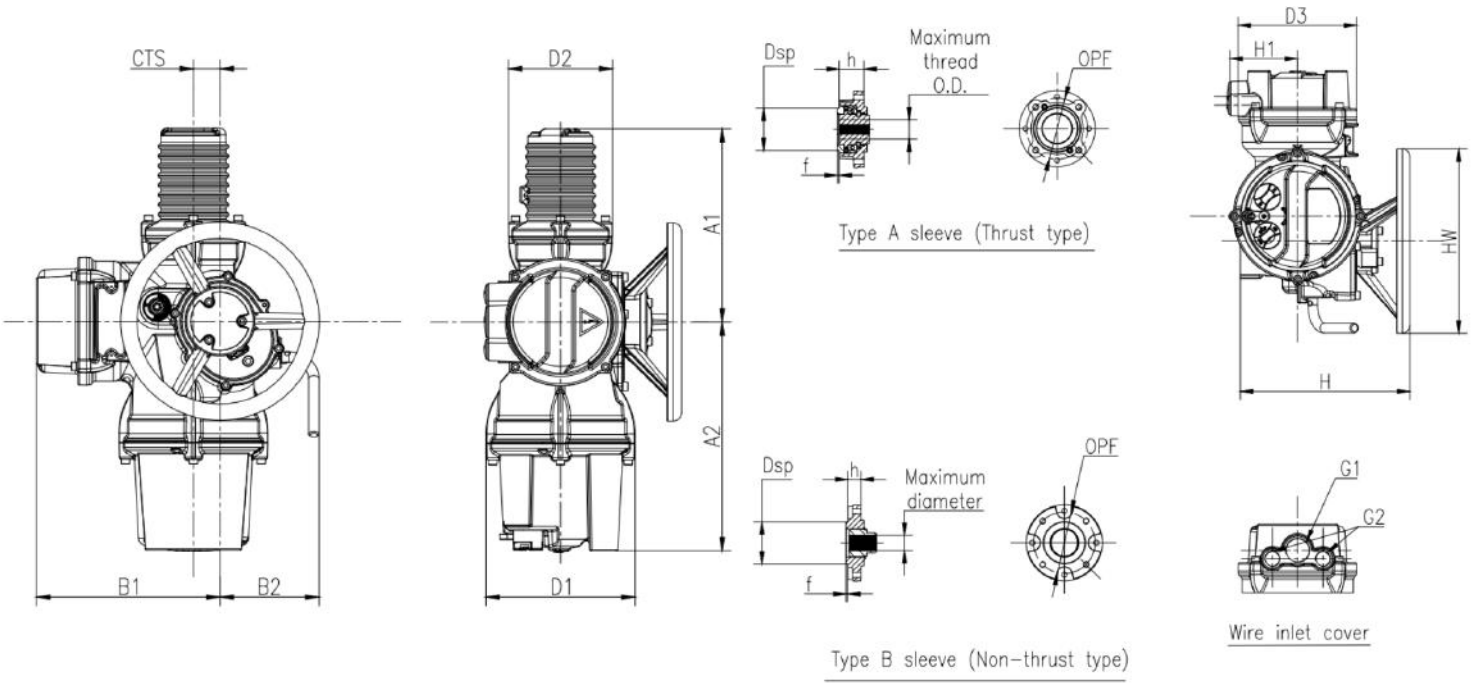
Other functions

- Interval timing operation (multi-speed control)
- Fieldbus control
- Electronic latch function
- Advanced real-time clock
- Intelligent diagnostic function

Remote Control Circuit Diagram

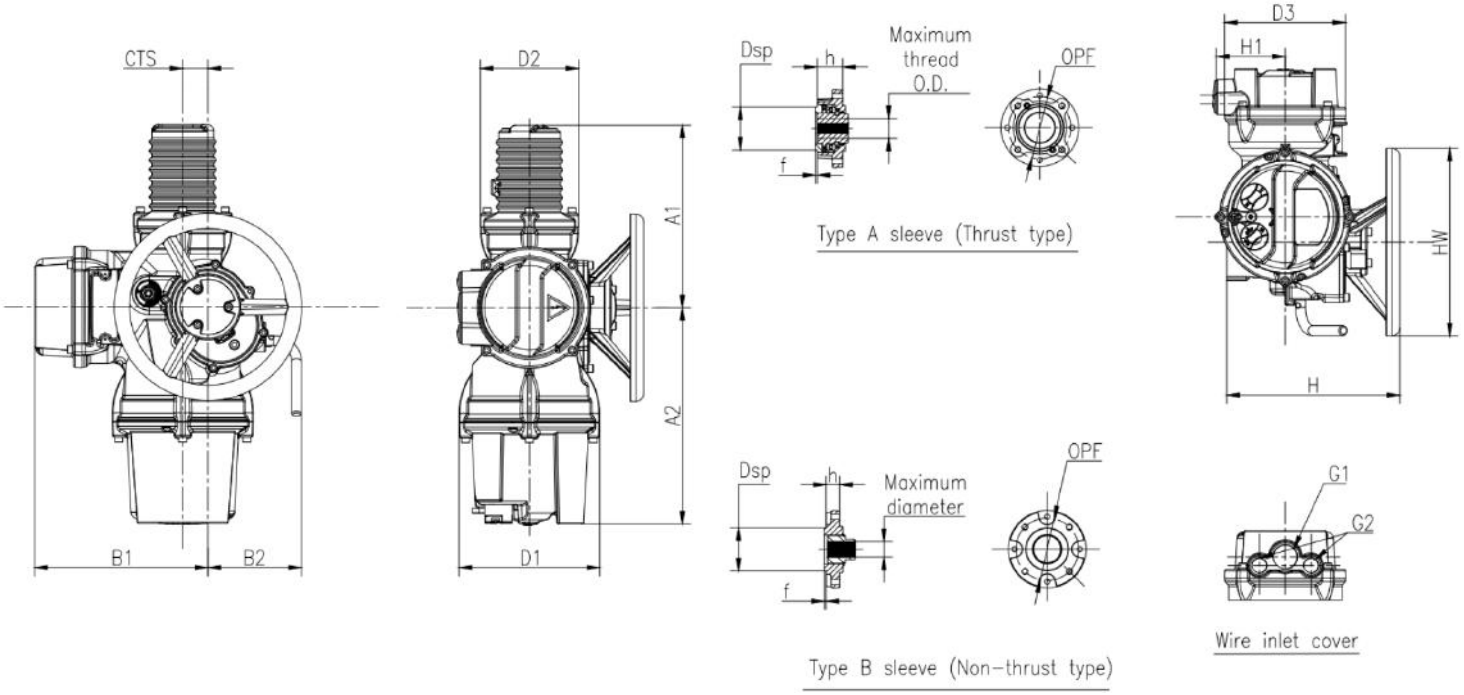


Model Selection-Dimensions



Actuator Model	A1	A2	B1	B2	H	H1 (without dust cover)	D1	D2	D3	CTS	Handwheel HW
VSM07	297	374	299	151	280	112	229	160	196	41	305
VSM11	297	374	299	151	280	112	229	160	196	41	305
VSM13	297	374	299	151	280	112	229	160	196	41	305
VSM14	353.5	409	321	145	292	112	229	191	196	60	450
VSM16	353.5	409	321	145	292	112	229	191	196	60	450
VSM30	488	469	366	314	360	112	229	269	196	91	400
VSM40	488	469	366	314	360	112	229	269	196	91	400
VSM50	561	469	366	314	360	112	229	269	196	91	400
VSM55	561	469	366	314	360	112	229	269	196	91	400

Model Selection-Dimensions



Actuator Model	OPF	DSP	Cable entry hole		Type A shaft sleeve			Type B shaft sleeve		
			G1	G2	h	f	Maximum thread O.D.	h	f	Maximum diameter
VSM07	F10	70	M40x1.5	2xM25x1.5	41	3	32	22	3	20
VSM11	F10	70	M40x1.5	2xM25x1.5	41	3	32	22	3	20
VSM13	F10	70	M40x1.5	2xM25x1.5	41	3	32	22	3	20
VSM14	F14	100	M40x1.5	2xM25x1.5	69	4	51	25	4	32
VSM16	F14	100	M40x1.5	2xM25x1.5	69	4	51	25	4	32
VSM30	F25/F30	200/230	M40x1.5	2xM25x1.5	98	5	73	45	5	60
VSM40	F25/F30	200/230	M40x1.5	2xM25x1.5	98	5	73	45	5	60
VSM50	F25/F30	200/230	M40x1.5	2xM25x1.5	98	5	73	45	5	60
VSM55	F30/FA30	230	M40x1.5	2xM25x1.5	122	5	83	45	5	60

RPM	18RPM	24RPM	36RPM	48RPM	72RPM	96RPM	144RPM
Actuator Model	Maximum output torque at corresponding speed N.M 380VAC / 3PH / 50Hz						
VSM07	35	35	35	35	35	35	-
VSM11	80	80	70	60	50	40	-
VSM13	110	110	80	70	60	50	-
VSM14	200	200	200	200	180	150	105
VSM16	400	400	300	250	250	230	150
VSM16.2	600	600	-	-	-	-	-
VSM30	1000	1000	850	680	680	550	410
VSM40	1500	1500	1300	1000	1000	750	650
VSM50	2000	2000	1700	1360	1360	1000	870
VSM55	-	3000	-	-	-	-	-

- Models highlighted in the specified color are available for standard selection. Inquiries regarding other models should be directed to the sales department.
- The torque shown in the table is the maximum allowable set torque in both rotation directions.
- The jammed torque is 1.4 to 2 times of this value depending on different speed and voltage.

Thrust Type

Thrust type (Type A sleeve)

Mainly used for the occasion of large axial force, different drive sleeve can be chosen according to the valve stem shaft.

Non thrust type (Type B sleeve)

Mainly used in the absence of axial force, different drive sleeve can be chosen according to the valve stem shaft diameter and mode .

LOT Module (Alternate Options)

- Vtek SMART–IiOT LOT module (alternate options) Essential products for actuators entered industry 4.0
- Data monitoring in the wireless age
- Wireless 4G/5G link adaptation
- Plant safety application

Paint and Colors

Infrared Remote Control

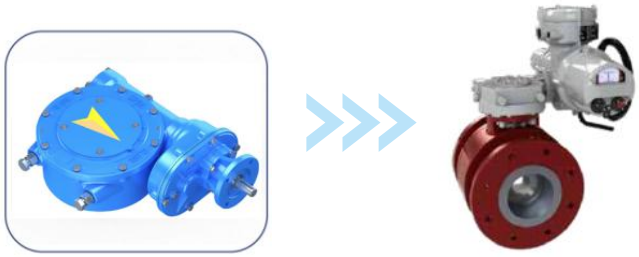
- Infrared non-intrusive setting
- Intelligent diagnostics via actuator display
- Intrinsically safe
- 0.7m safe operating distance, 60° safe operating angle
- Standard AA batteries

Separated Electric Actuator (Alternate Options)

- Designed for harsh working conditions
- Separate the electrical and mechanical parts to protect the electrical components from harsh working conditions such as high temperature and vibration
- Split layout
- Modular design, highly versatile components
- Does not affect the original functions and applications
- Split layout with a maximum distance of up to 200m
- IP68 waterproof standard
- IEC ATEX DIICT4 explosion-proof standard

Model Selection-Gearbox

Part-turn type

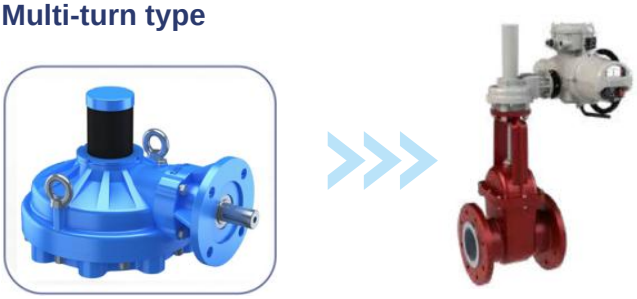


EW series part-turn gearboxes are suitable for ball valves, butterfly valves, plug cocks and other 90° rotary valves, and can also be used in flow baffles and power plant dampers.

- Various sizes with output torque up to 128,000Nm
- Speed ratios from 38:1 to 4346:1
- Ductile iron housing
- High sealing design, easy oil filling
- Wear-resistant structure for long life
- Hardened worm gear with high strength
- Wide range of speed ratios
- Detachable spline sleeve
- Detachable bushing circlips
- IP67

Options: IP68, high and low temperature environments, limit switch connections, input flanges, output flanges, multi-turn outputs.

Multi-turn type



EB series multi-turn gearboxes are suitable for valves such as gate valves, globe valves and sluice gates.

- Multiple sizes with output torque up to 64,000Nm
- Speed ratios from 3:1 to 1132:1
- Totally enclosed gearing
- Lubricating grease filling, easy oil filling
- Wide range of speed ratios
- Removable output sleeve
- IP67

Options: IP68, high and low temperature environments, secondary reduction, input flange, output flange.

Linear type

EL series linear gearboxes are mainly suitable for regulating valves and are used in the fields of power, oil and gas, water treatment and conventional industrial process control.

- Totally enclosed drive unit
- High grease filling life
- Good appearance, color zinc plated surface
- Copper alloy nut, high transmission efficiency and wear resistance
- Connection in accordance with ISO52010
- IP67

Options: IP68, input flange, travel, continuous adjustment.

Smart master station

Smart Master Station fieldbus controller supports ring network redundancy. The fieldbus controller is the core equipment of the ring communication control system dedicated to electric valves. It forms an actuator control system with MODBUS bus communication electric actuators. The controller monitors and controls the electric actuator through a twisted pair wiring. The communication network adopts RS-485 interface and Modbus protocol to realize the function of loop redundancy. Its redundancy can ensure that the disconnection of communication cable at a single point will not affect the normal operation of loop electric actuator. Each electric actuator is assigned with a settable address, usesthe twisted pair network for communication, executes action commands such asstart, close and stop, and uses the same communication network to transmit thestatus and alarm diagnosis information of all electric actuators (including opencircuit, grounding, short circuit and other faults of loop communication).

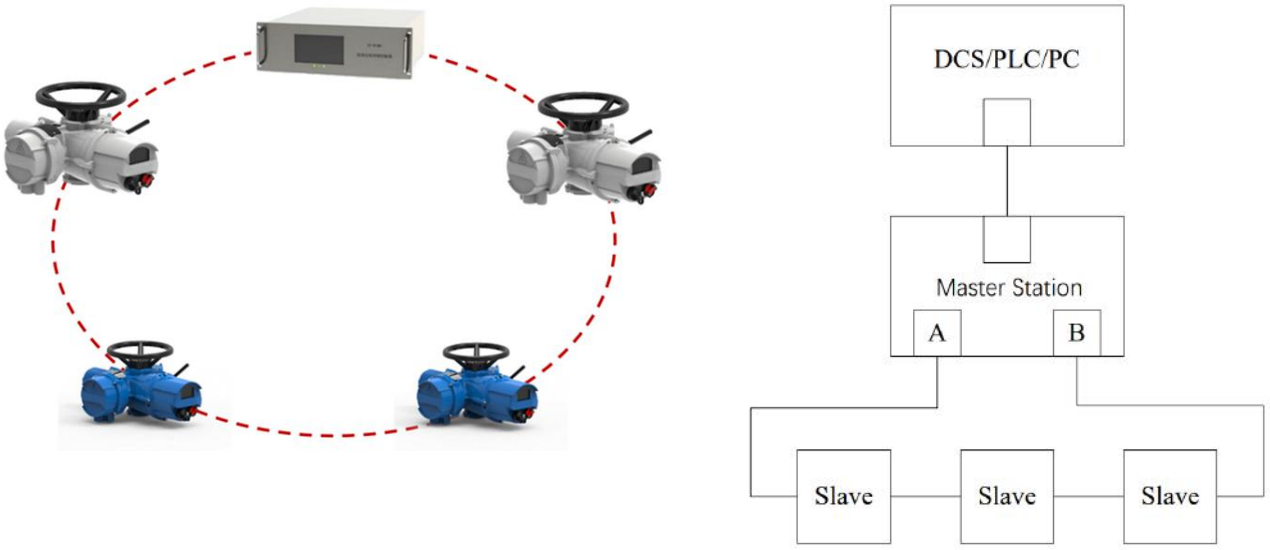


Figure 1-1

- Two-wire fieldbus system
- Intelligent terminal
- Supports a variety of actuator devices
- The maximum number of supported devices is 240 devices/each host
- The maximum distance of the loop is 20Km (no relay)

Smart master station

There are generally three kinds of network topologies between fieldbus controller and field equipment:

Figure 1-2 (a) shows the single bus mode. This topology is relatively simple and saves cables. Multiple nodes are connected to one bus at the same time, and each device only needs one interface. However, the reliability of this structure is not high. If one of the lines fails, many nodes will leave the network.

Figure 1-2 (b) shows the structure of the two-way bus. The master station and field unit have two interfaces. Under normal circumstances, only one bus works. When there is a problem in one section, it will be switched to another bus. This design greatly improves the reliability of the network, but at the same time, the number of cables is doubled.

The other is the ring network structure shown in Figure 1-2 (c). The equipment supporting this structure also needs to have two interfaces. When a certain section of the network fails, it can transmit data from another direction and locate the location of the failure. At the same time, the field equipment can enhance the signal of the transmitted data, which is conducive to prolonging the length of the whole network, Moreover, this method saves more cables than the dual bus structure, so the ring network structure is widely used in practical applications.

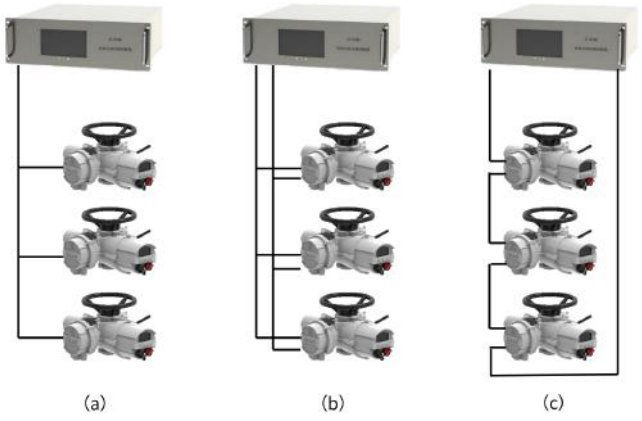


Figure1-2

The redundant network structure of Fieldbus controller ring network can automatically change the signal transmission direction and locate the fault location in case of line fault. Its implementation mechanism is shown in Figure 1-3. Figure 1-3 (a) shows that the line is broken at a certain point, so all subsequent equipment cannot transmit data in a normal way. At this time, After the controller with ring network redundancy function detects this fault, it starts another interface, as shown in Figure 1-3 (b), so that the equipment that has been disconnected can work normally again. Moreover, by comparing with the equipment connected to the two interfaces, the fault location can be accurately located (thick line indicates data communication).

Smart master station

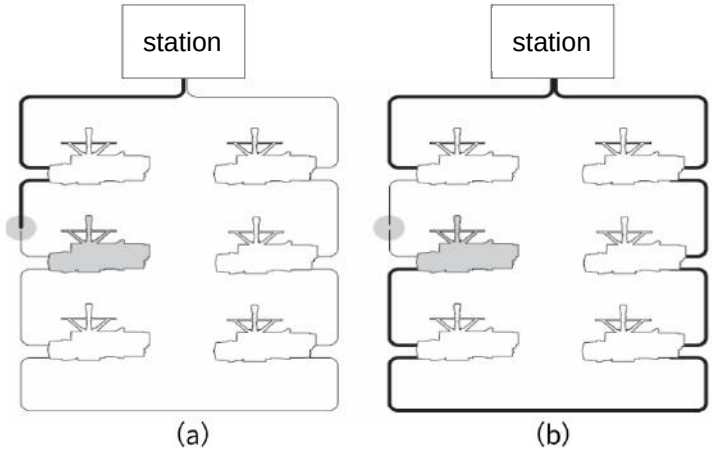


Figure1-3

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Water treatment




Power





Oil & Gas






Notice

⚠Notice

The performance data of products such as pressure and rated temperature recorded on this sample are based on national standard specifications and summarized by our company based on design, calculation, internal testing, and actual use of on-site products. The products introduced on this sample are mainly provided to customers who use them under general conditions. If you need to use these products under special conditions, please contact our company in advance, or the customer can conduct research and evaluation on the performance of these products before using them. Our company is not responsible for any damage or personal injury caused by careless use. In addition, although our company has made every effort to prepare samples, we cannot be held responsible for any errors, inadequacies, or inadequacies. The content described on this sample can be corrected at any time as deemed necessary by our company: discontinuation of product production, design changes, and product introductions.

Vtek Controls, LLC
420-H Wards Corner Rd
Loveland, OH 45140
Ph 513-928-3630
www.vtekcontrols.com