ML8824M Series

Multifunctional Electric Linear Actuator

Honeywell ML8824M series multifunctional linear electric actuators are used to control linear electric valves – Pressure Independence Control Valves (abbreviation: PICV) and electric globe valves. ML8824 series electric linear actuators can be connected to dedicated temperature sensors and pressure sensors and transmitted to the controller through the Modbus protocol for parameter collection of various control applications (supply and return water temperature difference control, pressure difference control, return water temperature control, etc.).

ML8824 series electric linear actuators are equipped with Honeywell PICV (VPIC series) and dedicated temperature sensors can achieve energy consumption calculating for qualitative analysis of energy consumption of air-conditioning equipment.

ML8824 series electric linear actuators use Modbus RTU communication protocol, which can quickly and accurately transmit data to ensure more accurate valve control. Various parameters can be set and modified through register addresses to achieve different control requirements.

Order Information and Technical Specification

Actuator SKU	Thrust Force	Stroke
ML8824M0620	≥600N	26mm
ML8824M1820	≥1800N	26mm
ML8824M1840	≥1800N	46mm

Dedicated sensor	Description
ML8824M-TS015	Immersion temperature sensor for pipe DN15
ML8824M-TS020	Immersion temperature sensor for pipe DN20
ML8824M-TS025	Immersion temperature sensor for pipe DN25
ML8824M-TS032	Immersion temperature sensor for pipe DN32
ML8824M-TS040	Immersion temperature sensor for pipe DN40
ML8824M-TS050	Immersion temperature sensor for pipe DN50
ML8824M-TS065	Immersion temperature sensor for pipe DN65
ML8824M-TS080	Immersion temperature sensor for pipe DN80
ML8824M-TS100	Immersion temperature sensor for pipe DN100
ML8824M-TS125	Immersion temperature sensor for pipe DN125
ML8824M-TS150	Immersion temperature sensor for pipe DN150
ML8824M-PS16S	Liquid pressure sensor for supple pipe, 0-16bar
ML8824M-PS16R	Liquid pressure sensor for return pipe, 0-16bar

Note:

1. Select temperature sensors and pressure sensors according to the required function.
2. The immersion temperature sensor has been equipped with a special well during production, so there is no need to use another well to avoid inaccurate temperature measurement.
3. It is recommended to insert the temperature sensor into the position of 1/2 to 2/3 of the pipe diameter to ensure the accuracy of temperature measurement.

Basic Parameters

SKU		ML8824M0620	ML8824M1820	ML8824M1840
Thrust Force		≥600N	≥1800N	≥1800N
Stroke		26mm	26mm	46mm
Running time		3s/mm or 4s/mm	2s/mm or 3s/mm	2s/mm or 3 s/mm
Power Consumption		10VA	18VA	18VA
Power Supply		24Vac ± 15% ,50/60Hz；24Vdc +15% ,-10%; Class 2/ SELV		
Communication Protocol		Modbus RTU		
Available Medium & Temperature		Water: up to 130℃		
Operation Environment		-10℃ to +55 ℃，5% to 95% RH （Non-condensing）		
Storage Environment		-40℃ to +65 ℃，5% to 95% RH (Non-condensing)		
Protection Class		IP54		
Electrical Protection Class		III (EN60730-1)		
Certification		EN IEC 61000-6-2: 2019; EN IEC 61000-6-4: 2019		
Electromagnetic Compatibility (field of application)		For use in residential, commercial and industrial environments.		
Wiring Terminals		1.5mm^2		
Cable Connector		PG13.5， Reserved PG13.5 and PG9		
Material	Cover	PC Plastic	PC Plastic	PC Plastic
	Housing	Plastic	Cast aluminum	Cast aluminum
	Bracket	Cast aluminum	Cast aluminum	Cast aluminum
Weight		1.3kg	2.3kg	2.4kg

Temperature Sensor	Type of Sensors	Immersion Temperature Sensors，PT1000
	Accuracy and Measuring range	0.2K @ 0℃，-20℃ to 150℃
	Well Material and PN	SS304，PN25
	Cable length	Four-wire，8 meters

Pressure Sensors	Signal Transmission	RS485
	Accuracy	±0.5% FS
	Applicable Medium Temperature	-10℃ to 80℃
	Compensation temperature	0℃ to 50℃
	Measuring Range	0-1600kPa
	Protection Class	IP68
	Cable Length	8 meters

Functional Description

Functions	Description
Energy Consumption Calculation (only for working with VPIC series PICV)	The ML8824M series actuator works with the VPIC series PICV to count the energy consumption of the controlled heat exchange equipment (air conditioning units, heat exchangers, etc.), and can output heat energy and cooling energy according to the working mode of the equipment. Heat and cold energy are accumulated based on the water volume, temperature difference and operating time of the equipment, and the read value is the real-time cumulative value. The energy accumulation can be cleared through the corresponding Modbus register variable.
Stroke Self-adaption	Through stroke self-adaption, the actuator can accurately mark the fully open and fully closed positions of the valve, thereby ensuring that the valve can be fully opened and fully closed, which can ensure control accuracy. The actuator can start self-adaption operation mode by setting the corresponding Modbus register variables. It can also be set whether self-adaption operation is required when the power is on. The stroke self-adaption operation can be performed by manual button when the actuator is powered on.
Running Direction Setting	The running direction of the actuator can be set through the corresponding Modbus register variable
Water Temperature and Temperature Difference Measurement	Dedicated immersion temperature sensors can measure the supply and return water temperatures of the heat exchanger and transmit them to the actuator. The actuator's Modbus register has three temperature-related variables, corresponding to the supply water temperature, return water temperature, and temperature difference between supply and return water.
Water Pressure and Differential Pressure Measurement	The dedicated pressure sensor can measure the supply and return pressure of the heat exchanger and transmit it to the actuator. The actuator's Modbus register has three pressure-related variables, corresponding to the supply pressure, return pressure, and differential pressure between supply and return water.
Valve Instantaneous Flow Rate (only for working with VPIC series PICV)	When the ML8824M series actuator works with the VPIC series PICV, the real-time flowrate of the PICV can be read through the corresponding Modbus register variable.
Keep Position When Communication Is Interrupted	When the Modbus communication is interrupted or the actuator is offline, the actuator maintains the current position.
Maximum Opening Setting	The maximum operating opening of the actuator can be set through the corresponding Modbus register variable to limit the maximum flowrate of the PICV or the maximum opening of the globe valve. The maximum opening setting range is 30% to 100%.
Running Speed Setting	The running speed of the actuator can be set through the corresponding Modbus register variable, selecting high speed or low speed.

Modbus RTU Protocol Information

1. Register Address Information

ID#	Readable（R）/Writable（W）	Register Name	Description
1	R	Model	High Byte, Actuator model code: 0 to 255 Low Byte, Valve model code: 0 to 255
2	R	Actuator_ID_H	Actuator ID High Byte，Chip random ID
3	R	Actuator_ID_L	Actuator ID Low Byte，Chip random ID
4	R	Supply_Temp	Supply water temp: Bipolar data -200 to 1500 corresponds to -20.0 ℃ to 150.0 ℃
5	R	Return_Temp	Return water temp: Bipolar data -200 to 1500 corresponds to -20.0 ℃ to 150.0 ℃
6	R	Differential_Temp	Temperature difference between supply and return water, 0 to 1500 corresponds to 0℃ to 150.0℃
7	R	Supply_Pressure	Supply water pressure: bipolar data -9999 to 9999. Unit: kPa; Accuracy: rounded.
8	R	Return_Pressure	Return water pressure: bipolar data -9999 to 9999. Unit: kPa; Accuracy: rounded.
9	R	Differential_pressure	Differential pressure between Supply and return water: bipolar data -9999 to 9999. Unit: kPa; Accuracy: rounded.
10	R	Flow	Instantaneous flowrate: 0 to 65535 corresponds to 0 to 655.35. Unit: m3/h. When work with globe valve, the flowrate is 0.
11	R	Heat_Total_H	Total heat energy accumulated value，high byte. Unit: kwh, Accuracy: rounded
12	R	Heat_Total_L	Total heat energy accumulated value，low byte. Unit: kwh, Accuracy: rounded.
13	R	Cold_Total_H	Total cooling energy accumulated value，high byte. Unit: kwh, Accuracy: rounded.
14	R	Cold_Total_L	Total cooling energy accumulated value，low byte. Unit: kwh, Accuracy: rounded.

Modbus RTU Protocol Information

1. Register Address Information (Continued)

ID#	Readable（R）/Writable（W）	Register Name	Description
15	R	Feedback_Signal	Actuator position feedback signal, 0-1000 corresponds to 0-100.0%
16	R & W	Self_Adaption	Self-adaption mode, 0 = non-adaptive mode, 1 = Self-adaption mode. Default is 0. The actuator cannot accept control signals when in self-adaption mode.
17	R & W	Control_Signal	Actuator input control signal, default is 1000, 0 to 1000 corresponds to 0 to 100.0%
18	R & W	Zero_Clearing	Total energy accumulation value is reset: 0 = no reset, 1 = reset. Default is 0.
19	R & W	Speed	Actuator running speed, 0 = low speed, 1 = high speed，Default is 0.
20	R & W	Run_Mode	Forward and reverse mode, 0 = forward, 1 = reverse, Default is 0.
21	R & W	Maximum_Opening	Maximum opening setting value, default is 100. 30 to 100 corresponds to 30% to 100% opening
22	R & W	Self_Detecting_switch	Power-on self-adaption running when power-on, 0 = don't run self-adaption when power-on, 1 = run self-adaption when power-on. Default is 1.
23	R & W	Actuator_ID_WH	Target actuator ID high byte, set executor ID.
24	R & W	Actuator_ID_WL	Target actuator ID low byte, set executor ID.
25	R & W	485_Parameter_Settings	Target actuator Modbus parameter settings: **High byte**, Actuator Modbus address: 1 to 247; **Low byte high 4 bits**, Modbus baud rate: 0 = 2400, 1 = 4800, 2= 9600; **Low byte low 4 bits**, Modbus checksum: 0 = no checksum, 1 = odd checksum, 2 = even checksum; Default value: Communication address is 1, baud rate is 9600, no checksum
26	R & W	Valve_Pairing	Target actuator matching valve model code: 0 to 255

Modbus RTU Protocol Information

2. List of valve body SKU corresponding to target actuators

Code of Actuator	Target actuator SKU	Code of compatible valves	Type of Valve	Corresponding valve SKU
6	ML8824M0620	1	PICV	VPIC16R-025
		2		VPIC16R-032
		3		VPIC16R-040
		4		VPIC16R-050
		5		VPIC16R-025P
		6		VPIC16R-032P
		7		VPIC16R-040P
		8		VPIC16R-050P
		9		VPIC16F-050P
		10		VPIC16F-065P
		11		VPIC25R-025
		12		VPIC25R-032
		13		VPIC25R-040
		14		VPIC25R-050
		15		VPIC25R-025P
		16		VPIC25R-032P
		17		VPIC25R-040P
		18		VPIC25R-050P
		19		VPIC25F-050P
		20		VPIC25F-065P
		21	Globe Valves	V5GV2W series V6GV series V5011B2W series V5011S2W series
8	ML8824M1820	1	Globe Valves	
7	ML8824M1840	1	PICV	VPIC16F-080P
		2		VPIC16F-100P
		3		VPIC16F-125P
		4		VPIC16F-150P
		5		VPIC25F-080P
		6		VPIC25F-100P
		7		VPIC25F-125P
		8		VPIC25F-150P
		9	Globe Valves	V5GV2W series V6GV series V5011B2W series V5011S2W series

Data on matching actuators and valves

SKU of Valves	DN	PN	Stroke mm	Close Differential Pressure（kPa）		
				ML8824M0620	ML8824M1820	ML8824M1840
VPIC16R-025	DN25	PN16	20	400	——	——
VPIC16R-032	DN32	PN16	20	400	——	——
VPIC16R-040	DN40	PN16	20	400	——	——
VPIC16R-050	DN50	PN16	20	400	——	——
VPIC16R-025P	DN25	PN16	20	400	——	——
VPIC16R-032P	DN32	PN16	20	400	——	——
VPIC16R-040P	DN40	PN16	20	400	——	——
VPIC16R-050P	DN50	PN16	20	400	——	——
VPIC16F-050P	DN50	PN16	20	600	——	——
VPIC16F-065P	DN65	PN16	20	600	——	——
VPIC16F-080P	DN80	PN16	40	——	——	600
VPIC16F-100P	DN100	PN16	40	——	——	600
VPIC16F-125P	DN125	PN16	40	——	——	600
VPIC16F-150P	DN150	PN16	40	——	——	600
VPIC25R-025	DN25	PN25	20	400	——	——
VPIC25R-032	DN32	PN25	20	400	——	——
VPIC25R-040	DN40	PN25	20	400	——	——
VPIC25R-050	DN50	PN25	20	400	——	——
VPIC25R-025P	DN25	PN25	20	400	——	——
VPIC25R-032P	DN32	PN25	20	400	——	——
VPIC25R-040P	DN40	PN25	20	400	——	——
VPIC25R-050P	DN50	PN25	20	400	——	——
VPIC25F-050P	DN50	PN25	20	600	——	——
VPIC25F-065P	DN65	PN25	20	600	——	——
VPIC25F-080P	DN80	PN25	40	——	——	600
VPIC25F-100P	DN100	PN25	40	——	——	600
VPIC25F-125P	DN125	PN25	40	——	——	600
VPIC25F-150P	DN150	PN25	40	——	——	600

Data on matching actuators and valves

SKU of Valves	DN	PN	Stroke mm	Close Differential Pressure（kPa）		
				ML8824M0620	ML8824M1820	ML8824M1840
V5GV2W015F-E	DN15	PN16	20	1000	1600	— —
V5GV2W020F-E	DN20	PN16	20	1000	1600	— —
V5GV2W025F-E	DN25	PN16	20	700	1600	— —
V5GV2W032F-E	DN32	PN16	20	1000	1600	— —
V5GV2W040F-E	DN40	PN16	20	1000	1600	— —
V5GV2W050F-E	DN50	PN16	20	1000	1600	— —
V5GV2W065F-E	DN65	PN16	20	1000	1600	— —
V5GV2W080F-E	DN80	PN16	20	1000	1600	— —
V5GV2W100F-E	DN100	PN16	40	— —	— —	1600
V5GV2W125F-E	DN125	PN16	40	— —	— —	1600
V5GV2W150F-E	DN150	PN16	40	— —	— —	1600
V5011S2W015	DN15	PN16	10	1100	1600	— —
V5011S2W020	DN20	PN16	10	1100	1600	— —
V5011S2W025	DN25	PN16	15	780	1600	— —
V5011S2W032	DN32	PN16	20	500	1600	— —
V5011S2W040	DN40	PN16	20	300	950	— —
V5011S2W050	DN50	PN16	20	200	630	— —
V5011B2W015	DN15	PN16	20	1600	1600	— —
V5011B2W020	DN20	PN16	20	1600	1600	— —
V5011B2W025	DN25	PN16	20	800	1600	— —
V5011B2W032	DN32	PN16	20	500	1600	— —
V5011B2W040	DN40	PN16	20	350	950	— —
V5011B2W050	DN50	PN16	20	220	630	— —

Data on matching actuators and valves

SKU	PN	DN	Stroke mm	Close Differential Pressure（kPa）		
				ML8824M0620	ML8824M1820	ML8824M1840
V6GV216F-W015	PN16	DN15	20	1600	1600	—
V6GV216F-W020	PN16	DN20	20	1200	1600	—
V6GV216F-W025	PN16	DN25	20	800	1600	—
V6GV216F-W032	PN16	DN32	20	1600	1600	—
V6GV216F-W040	PN16	DN40	20	1600	1600	—
V6GV216F-W050	PN16	DN50	20	1200	1600	—
V6GV216F-W065	PN16	DN65	20	900	1600	—
V6GV216F-W080	PN16	DN80	20	700	1600	—
V6GV216F-W100	PN16	DN100	40	—	—	1600
V6GV216F-W125	PN16	DN125	40	—	—	1600
V6GV216F-W150	PN16	DN150	40	—	—	1600
V6GV225F-W015	PN25	DN15	20	1600	2500	—
V6GV225F-W020	PN25	DN20	20	1200	2500	—
V6GV225F-W025	PN25	DN25	20	800	2500	—
V6GV225F-W032	PN25	DN32	20	1600	2500	—
V6GV225F-W040	PN25	DN40	20	1600	2500	—
V6GV225F-W050	PN25	DN50	20	1200	2500	—
V6GV225F-W065	PN25	DN65	20	900	2500	—
V6GV225F-W080	PN25	DN80	20	700	2500	—
V6GV225F-W100	PN25	DN100	40	—	—	2500
V6GV225F-W125	PN25	DN125	40	—	—	2300
V6GV225F-W150	PN25	DN150	40	—	—	1800

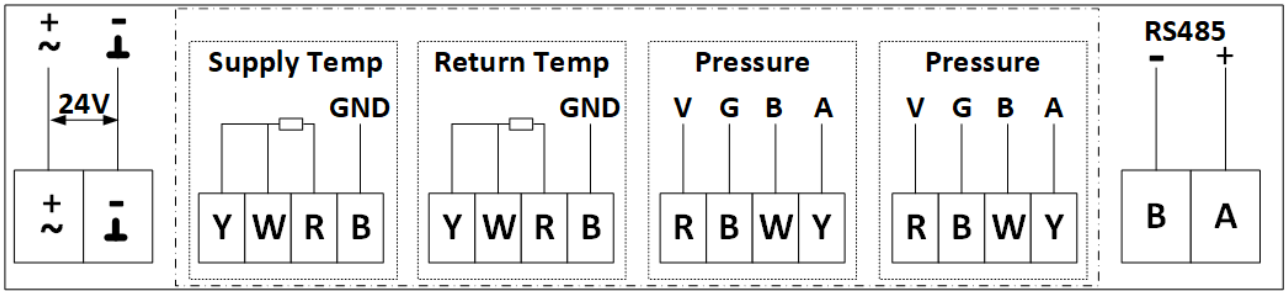
Set the Max Flowrate for PICV

PICV SKU	Open and Flowrate（m3/h）							
	30%	40%	50%	60%	70%	80%	90%	100%
VPIC16R-025(P)	0.29	0.41	0.55	0.70	0.85	1.12	1.43	2.00
VPIC16R-032(P)	0.90	1.23	1.63	1.83	2.05	2.43	3.46	4.00
VPIC16R-040(P)	1.77	2.02	2.35	2.45	2.73	3.52	5.27	6.00
VPIC16R-050(P)	1.87	2.02	2.34	2.56	3.11	3.79	4.96	8.00
VPIC25R-025(P)	0.21	0.34	0.45	0.61	0.81	1.13	1.46	2.00
VPIC25R-032(P)	0.70	1.00	1.48	2.21	2.88	3.36	3.82	4.00
VPIC25R-040(P)	0.88	1.16	1.57	2.38	3.16	3.87	4.74	6.00
VPIC25R-050(P)	1.62	2.04	2.46	2.97	3.68	4.86	6.36	8.00
VPIC16F-050P	1.21	2.17	3.14	4.33	6.22	8.24	10.96	13.00
VPIC16F-065P	5.96	7.65	9.53	11.53	13.91	17.68	20.84	26.00
VPIC16F-080P	3.32	4.86	6.90	9.76	13.27	16.84	23.04	32.00
VPIC16F-100P	17.30	21.05	25.10	29.62	35.50	43.37	51.39	55.00
VPIC16F-125P	8.38	12.45	19.27	29.81	46.28	65.15	80.05	90.00
VPIC16F-150P	17.22	40.95	69.01	90.94	108.45	119.86	128.97	145.00
VPIC25F-050P	1.21	2.17	3.14	4.33	6.22	8.24	10.96	13.00
VPIC25F-065P	1.80	2.67	3.51	5.10	7.79	11.07	16.02	21.00
VPIC25F-080P	1.76	2.83	4.59	6.93	9.53	13.69	18.95	28.00
VPIC25F-100P	6.15	8.45	11.74	15.84	22.64	33.15	42.96	50.00
VPIC25F-125P	8.04	10.69	15.75	22.02	33.22	50.42	70.03	90.00
VPIC25F-150P	12.22	21.95	36.01	55.94	80.45	105.86	128.97	145.00

Setting and calculation method:
1. Select the PICV according to the actual flowrate of Equipment, the maximum flowrate of the selected PICV is required to be larger than the actual flowrate required by the equipment.
2. If the actual flowrate required by the equipment is close to the opening-flowrate shown in the table above, it can be set directly according to the opening percentage corresponding to the flowrate.
3. If the actual flowrate required by the equipment is exactly between the flow values corresponding to the two openings, the opening can be calculated according to the insertion method, and the opening percentage can be set with the calculated opening value.
4. This opening setting mainly corresponds to the parameter setting of register address table #21, maximum opening setting (English name is Maximum Opening). Input numbers from 30 to 100 correspond to openings from 30% to 100%, and the default value is 100.

Example: The flow value required by the AHU equipment is 47m3/h, and the equipment pipeline pressure level is PN16. According to the flow value, the selected PICV model is VPIC16F-100P, and the maximum flow value of the equipment is 55 m3/h.
The flowrate required by the device is between the flow values corresponding to 80% opening and 90% opening, so it is necessary to calculate according to the insertion method. The calculation process is as follows:
80%+10%*（47-43.37）/（51.39-43.37）=84.5%, the percentage is rounded to 85%
Therefore, the maximum opening setting value of the PICV selected by the AHU device is 85%, and the number entered in the register address(#21) is 85.

Wiring Diagram and Instructions



Wiring Instructions

1.The wiring terminals of ML8824M are divided into three parts: power line terminals, sensor terminals and RS485 communication line terminals.

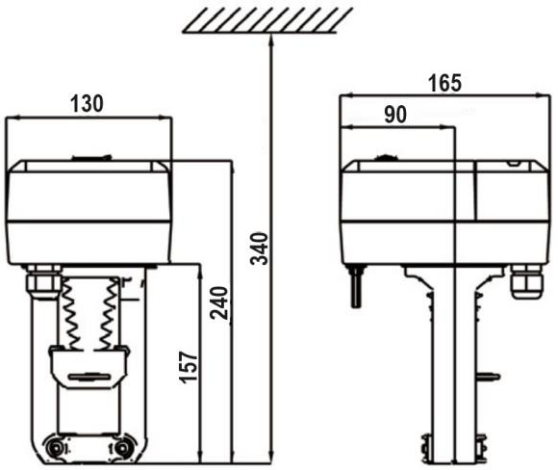
2.The wiring of the power line terminals and RS485 communication line terminals should be wired according to the functions of the terminals.

3.For the wiring of the sensor, please find the corresponding sensor cable colors and wire them with the corresponding terminals according to the sensor functions. Y=Yellow, W=White, R=Red, B=Blue.

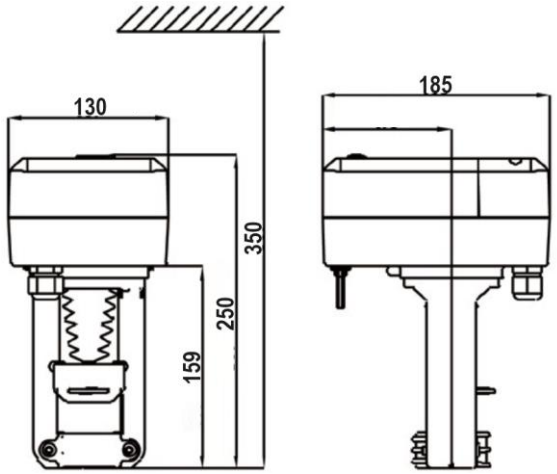
4.The cable length of the sensor will affect the measurement accuracy, so please do not extend or shorten the cable length without permission.

5.Shielded wires are required for RS485 wiring to ensure smooth communication.

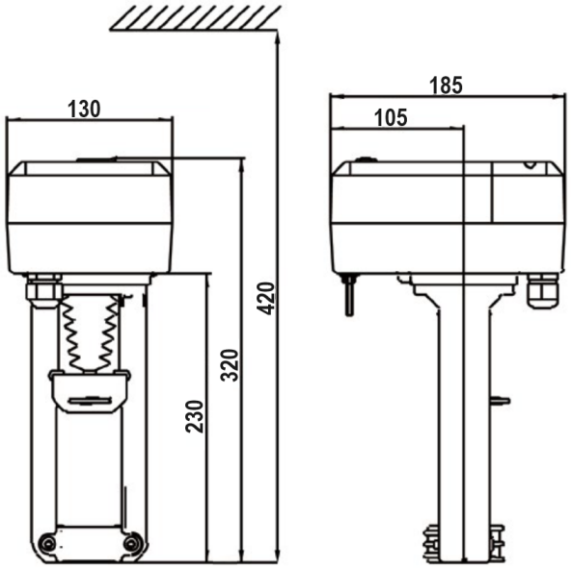
Actuator Dimension（mm)



ML8824M0620

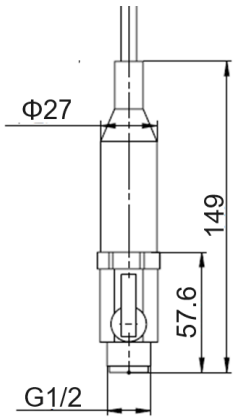


ML8824M1820

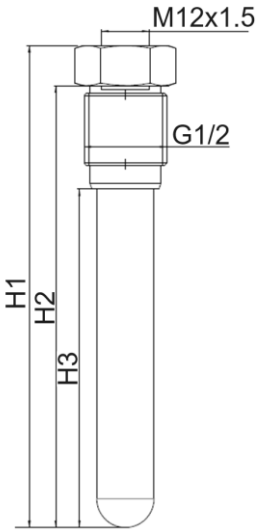


ML8824M1840

Sensors Dimension（mm）



Pressure sensors



Immersion Temperature sensors

SKU	H1	H2	H3	Welding pipe connection thread
ML8824M-TS015	71	61	35	G1/2
ML8824M-TS020 ML8824M-TS025 ML8824M-TS032	76	66	40	G1/2
ML8824M-TS040 ML8824M-TS050	81	71	45	G1/2
ML8824M-TS065 ML8824M-TS080	96	86	60	G1/2
ML8824M-TS100 ML8824M-TS125 ML8824M-TS150	121	111	91	G1/2

Honeywell Building Technologies
Greater China Building Business
Website: www.honeywell.com.cn
Service Hotline: 400-842-8487

THE FUTURE IS WHAT WE MAKE IT

Honeywell