

## QM3G-FH HMI PLC All-in-One User Manual

Thank you for purchasing Coolmay QM3G-FH HMI PLC All-in-One products. This manual mainly explains the product features, specifications and wiring methods. Detailed PLC programming, please refer to <Coolmay QM3G-FH HMI PLC All-in-One Programming Manual>. Detailed HMI part, refer to <Coolmay TK series HMI Programming Manual>.

The features are as below.

1. Super functions. PLC compatible with FX3G/FX3U/FX3S PLC. It operate fast.
  2. Highly integration. The digital points are 30 inputs and 30 outputs at most. The digital output can be transistor, relay or mixed output. Analog can reach up to 16 input and 8 output. It has 2 PLC COM port (RS232 and USB Port), 1 downloading port on HMI.
  3. Support several high-speed counting and high-speed pulse. Acceleration and deceleration are independent. The total high-speed counting and pulse can not exceed 480KHz.
  4. 32K steps program capacity, 32K power-off retentive registers, support interrupt, linear and circular interpolation, PID self-adjusting.
  5. Special encryption. Set password as 12345678 to thoroughly prevent reading data. (PLC only supports 8-bit password encryption)
  6. PLC is compatible with programming software GX Developer 8.86Q and GX Works2, and HMI is mView software.
  7. The network module can be selected according to customer requirements to realize remote control.
- More models are supported to customize if bulk order.

### Product Details

#### ◆ Naming rules QM3G-43FH-24MRT-4AD2DA-V-A0-1C1-1P-485P/232H

1. Series QM3G: QM3G-FH series
2. HMI 43FH: 4.3inch 50FH: 5inch 70FH/70HD/70KFH: 7inch t 100FH: 10inch
3. Digital input and output (DI/DO) 16: 8DI 8DO 24: 12DI 12DO 38: 20DI 18DO 44: 24DI 20DO 60: 30DI 30DO
4. Module type M: Main module of universal controller
5. Digital output (DO) type R: relay; T: transistor (MOS tube); RT: both relay and transistor
6. Analog input (AD) 4 channels for 43FH/50FH, 12 for 70FH/HD, 16 for 70KFH/100FH
7. Analog output (DA) 2 channels for 43FH/50FH, 8 for 70FH/70HD/70KFH/100FH
8. AI type E: Thermocouple E (can be customized as type K, T, S or J supports negative temperature)  
PT: PT100 PT1000; NTC: NTC thermistor 10K, 50K, 100K A0: 0-20mA A4: 4-20mA V5: 0-5V  
V: 0-10V V5\_: -5V~5V V\_: -10~10V (only 7 and 10 inch support V5\_ and V\_)
9. AO type A0: 0-20mA A4: 4-20mA V5: 0-5V V: 0-10V V5\_: -5V~5V  
V\_: -10~10V (only 7 inch and 10 inch support negative voltage covers 2 channels)
10. C1 single phase high-speed counting, C2 AB phase counting, C3 ABZ phase counting;  
Normally support 6 single phase 60KHz, or 2 AB (Z) 60KHz + 1 AB 10KHz
11. P0: 10KHz high speed pulse; P: 100KHz high speed pulse; Normally 8 channels, Y0-Y3 is 100KHz, Y4-Y7 is 10KHz; That high speed counting plus high speed pulse must be with 480KHz
12. com port optional refers to Chart 1 'basic parameter'

### ◆ Basic parameter

Chart 1: basic parameter

Specifications of HMI PLC All-in-One	digital points		analog points (optional)		COM port (optional)		High-speed counting			high speed pulse output
	DI	DO	AD	DA	HMI	PLC	single phase	AB phase	ABZ phase	
QM3G-43FH/50FH-16MR	8	8	4	2	QM3G-43FH/50FH come with 1xRS232 on HMI	1 RS485 or 2 RS485 can be optional on PLC (1485 port is changed from default 232 port)	Normally single phase 6 channels 60KHz	normally AB phase 2 channels 60KHz + 1 channel 10KHz	normally ABZ phase 2 channels 60KHz	Normally 8 channels: Y0-Y3 is 100KHz, Y4-Y7 is 10KHz
QM3G-43FH/50FH-24MRT	12	12	12	8						
QM3G-70FH/HD-24MR	12	12	12	8	QM3G-43FH/50FH can be added 1xWiFi on PLC (cannot coexist with default 232 on PLC)	7 and 10 inch can be added CAN/Ethernet/WiFi (Occupies the default port 232) on PLC	7 and 10 inch can be added CAN/Ethernet/WiFi (Occupies the default port 232) on PLC	Acceleration and deceleration are independent. High-speed counting and pulse can't over 480KHz.		
QM3G-70FH/HD-40MR	24	16	8	6						
QM3G-70FH/HD-44MT	24	20								
QM3G-70KFH/100FH-24MR	12	12								
QM3G-70KFH/100FH-38MR	20	18	16	8						
QM3G-70KFH/100FH-44MT	24	20								
QM3G-70KFH/100FH-48MR	24	24								
QM3G-70KFH/100FH-58MR	30	28	5	2						
QM3G-70KFH/100FH-60MT	30	30								

43FH/50FH : MT is MOS output. 70FH/70HD/70KFH/100FH : MT: Y0-Y3 is MOS transistor output, Y4-Y35 is transistor output; MR is relay output; MRT is mix output, Optional according to customer requirements

Chart 2: electric parameter

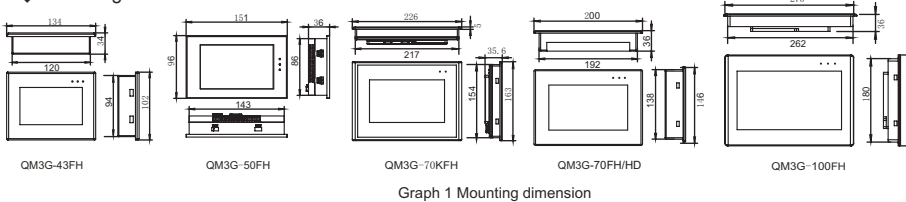
Electric parameter	
Input voltage	DC24V
Digital input indexes	
Isolation mode	Photocoupling
Input impedance	High-speed input 3.3KΩ Common input 4.3Ω
Input ON	High-speed input: current > 5.8mA/24V Common input: current > 9.9mA/24V
Input OFF	High-speed input: current < 4.5mA/19V Common input: current > 4mA/17V
Filter function	With filter function, the filter time can be set among 0-60ms, default is 10ms

(Continue to above table)

High-speed counting	Normally 6 channels single phase 60KHz or AB (Z) channel 2 channels 60KHz + AB phase 1 channel 10KHz
Input level	Passive NPN, common terminal isolation, S/S connected to 24V+
Digital relay output index	
Max current	2A/point, 4A/4 point COM, 5A/8 point COM, 5A/12 point COM
Circuit power voltage	Below DC30V/ Below AC220V
Circuit insulation	Relay mechanical insulation
On response time	Approx. 10ms
Mechanical life without load	10million times
Electric life with rated load	300,000 times
Output level	Dry contact, COM connects positive or negative
Digital transistor (MOS) output index	
Max current	MOS tube: 2A/point, 4A/4 point COM, 5A/12 point COM; MT: 0.5A/point, 0.8A/4 point COM, 1.6A/12 point COM
Circuit power voltage	DC24V
Circuit insulation	Optocoupler insulation
Isolated voltage (power-terminal)	1500VAC
On response time	High-speed output : 10 μs ; others : 0.5ms
High-speed output frequency	Normally 8 channels, Y0-Y3 is 100KHz, Y4-Y7 is 10KHz The total high-speed counting and pulse can not exceed 480KHz.
Output level	Low level NPN, COM connects negative
Analog input indexes	
Input signal	PT100/PT1000/thermocouple/NTC/0-10V/0-5V/10-10V/5-5V/0-20mA/4-20mA/customizations
Response time	1scanning cycle
Analog input	0-16 channels
Precision	12 bit
Analog output indexes	
Output signal	0-5V/0-10V/10-10V/5-5V/0-20mA/4-20mA/customizations
Analog output	0-8 channels
Precision	12 bit
External port	
com port	Refer to "Chart 1 : basic parameter"
Environment	
Operating temperature	0°C~50°C
Relative humidity	5%~95%RH
Storage temperature	-20°C~70°C
Vibrational frequency	10-57Hz, amplitude 0.035mm; 57Hz-150Hz, acceleration 4.9m/s <sup>2</sup> (10 times each on X, Y, Z, total 80 minutes each)

### Mechanical Design

#### ◆ Mounting dimension

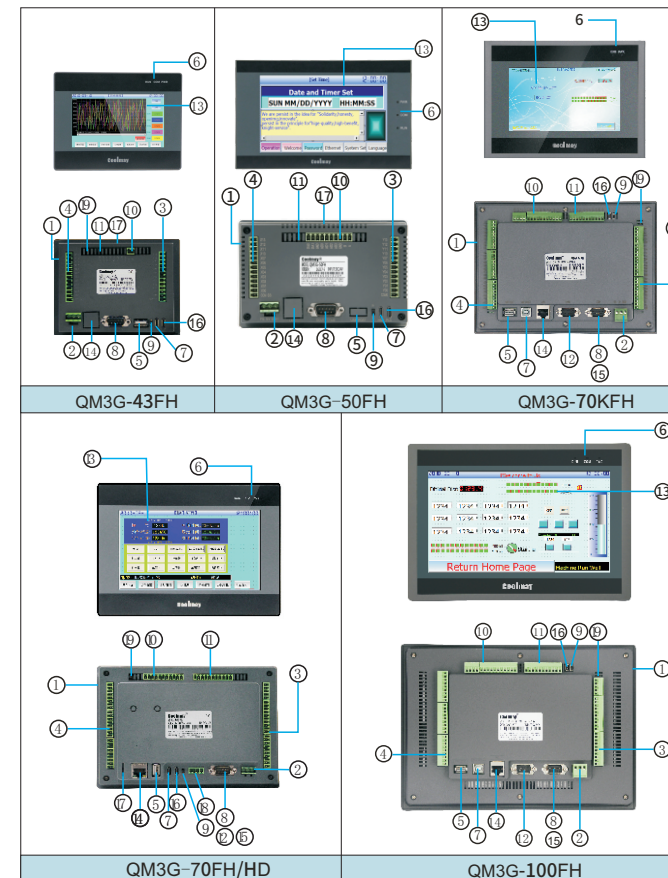


Model	Max digital points	Max analog points	Mounting dimension		Boundary dimension W*H*D (mm)
			A (mm)	B (mm)	
QM3G-43FH	12DI12DO	4AI2AO	120	94	134*102*34
QM3G-50FH	12DI12DO	4AI2AO	143	86	151*96*36
QM3G-70FH/HD	24DI20DO	12A8AO	192	138	200*146*36
QM3G-70KFH	30DI30DO	16AI8AO	217	154	226*163*35.6
QM3G-100FH	30DI30DO	16AI8AO	262	180	275*194*36

※ More specs can be customized if bulk order

### Electric Design

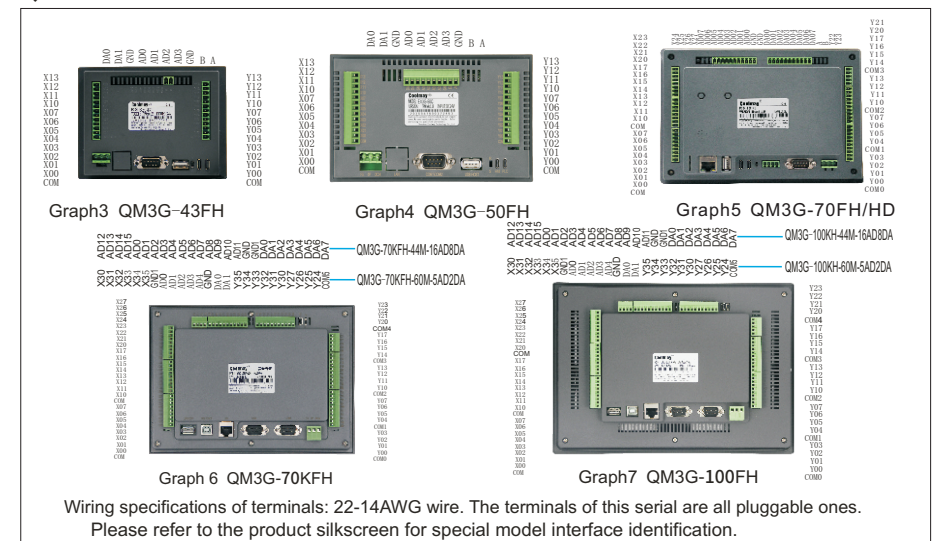
#### ◆ Product structure



- 1 Four side mounting holes
- 2 Terminal block of power supply FG: cover protection GND 0V: 24V negative 24V: 24V positive
- 3 Terminal block of DO
- 4 Terminal block of DI
- 5 USB port (under developing)
- 6 PWR: power indicator 43FH/50FH/70FH/70HD is Type-C port; 70KFH/100FH is Type-B port
- 7 HMI programming port 43FH/50FH/70FH/70HD is Type-C port; 70KFH/100FH is Type-B port
- 8 PLC programming RS232/RS485
- 9 PLC operating switch RUN/STOP
- 10 analog input [Note: A/B, A1/B1 is RS485]
- 11 analog output
- 12 HMI RS232/RS485/PLC-CAN
- 13 LCD
- 14 Ethernet port optional
- 15 WiFi optional
- 16 PLC USB programming port 43FH/50FH/70FH/70HD is Type-C port; 70KFH/100FH is mini USB port
- 17 SD card optional (under developing)
- 18 PLC/HMI RS485
- 19 WiFi switch optional

Chart 2 Product structure

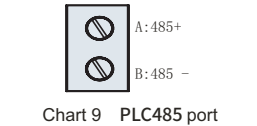
#### ◆ Hardware Interface



Definition of communication interface : Refer to Chart 4: Pin definition

COM1 Db9 port	Optional, cannot coexist with default 232 and WiFi (optional)	optional	default	default	Optional, cannot coexist with default 232 and 485-2 (optional)
PIN#	PLC-485-2 serial port3	PLC-485-1 serial port2	PLC-232 serial port3	HMI-232	PLC-WIFI
1	√(485+)				√
6	√(485-)				√
2			√(RXD)		√
3			√(TXD)		√
5			√(GND)	√(GND)	√
4				√(TXD)	
7				√(RXD)	
8					
9					
terminal 485		√			

Chart 4: Pin definition



(Continue to above table)

QM3G-70FH/HD All-in-One com port						QM3G-70KFH/100FH All-in-One com port								
COM1 DB9 port	PLC optional with default 232 and HMI optional 485 COM1 connect	PLC optional	PLC default	PLC optional with output 232 channel 485-2 connect	HMI optional	COM2(DB9 port near the power supply)				COM1 (DB9 port far away from the power supply)				Ethernet port
PIN#		PLC-CAN	PLC-232 serial port3	PLC-WIFI	HMI-232(default) with 485 on HMI	DB 9 port	optional	Optional and default 232. Optional 485 connect	default	Optional and default 232. Optional 485 connect	optional	optional	default	optional
2			√(RXD)	√		1	PLC-485-1 serial port2	PLC-485-2 serial port3	PLC-232 serial port3	PLC-WIFI	PLC-CAN	HMI-485	HMI-232	
3			√(TXD)	√		6	√(485+)					√(485-)		
5			√(GND)	√	√(GND)	2		√(RXD)	√			√(RXD)		
4					√(TXD)	3		√(TXD)	√			√(TXD)		
7					√(RXD)	5		√(GND)	√			√(GND)		
8		√(H)				4								
9		√(L)				7								
terminal A B		PLC-485-1 serial port2				8	√(485+)		√	√(H)				
terminal A1 B1	PLC-485-2 serial port3			√	HMI-485	9	√(485-)		√	√(L)				

※ Note: Detailed settings, please refer to "Coolmay QM3G-FH series All-in-One Programming Manual"

### Equivalent Circuit

The PLC input (X) is an externally powered DC24V sinker (passive NPN) and the input signal is isolated from the power supply. Connect COM to positive 24V of external power supply while using.

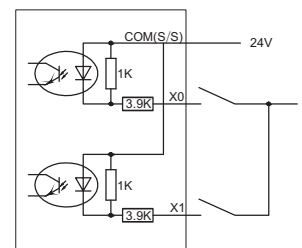


Diagram 10 Input wiring

PLC digital inputs wiring:  
 Ports short circuit: The COM (S/S) of the PLC input terminal is connected to 24V, and the X terminal is connected to the power supply 0V, that is, the input has a signal.  
 Two-wire system (magnetic control switch): The positive pole of the magnetic switch is connected to PLC X terminal, and the negative pole is connected to 0V.  
 Three-wire system (photoelectric sensor or encoder): The PLC switch is connected to a three-wire photoelectric sensor or encoder, the power supply of the sensor or encoder is connected to the positive electrode of the power supply, and the signal line is connected to the X terminal. The encoder and photoelectric sensor are required to be NPN type (PNP needs special customization).  
 PLC digital outputs wiring:  
 Transistor: Output is NPN, COM is connected to the negative pole, and Y is connected to the positive pole of the power supply with a load.  
 Relay: D ry contact output, COM can be connected to the positive or negative.

Diagram 11 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups. Each group is electrically isolated. Different groups of output contacts are connected to different power circuits

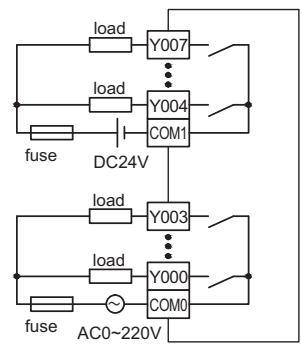


Diagram 11 Relay output equivalent circuit

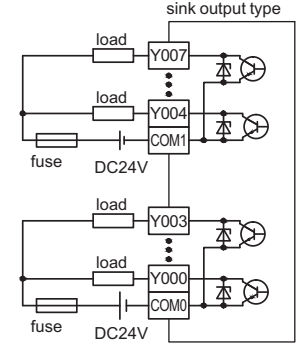


Diagram 12 Transistor output equivalent circuit

The equivalent circuit of the PLC output part of the transistor output type is shown in Diagram 12. As know from the figure, the output terminal are several groups, each group is electrically isolated, and different groups of output can be connected to different power circuits; the transistor output stage can only be used for DC24V load circuits. Output wiring is NPN, COM common cathode.

For the inductive load connected to the AC circuit, the external circuit should consider the RC transient voltage absorption circuit; corresponding to the inductive load of the DC loop, consider adding a freewheeling diode, as shown in Diagram 13.

Stepping or servo motor wiring as shown in Diagram 14, 3G series PLC default Y0-Y7 is pulse point, direction can be customized

Note: 5V drive must be connected to 2KΩ resistor on DC24V

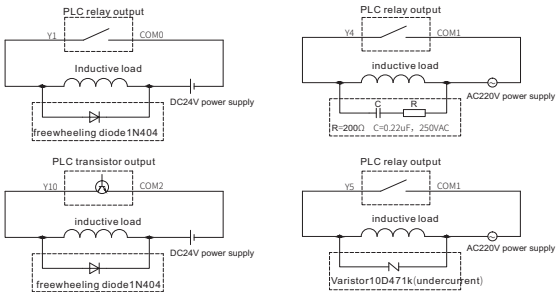


Diagram 13 Inductive load absorption circuit schematic

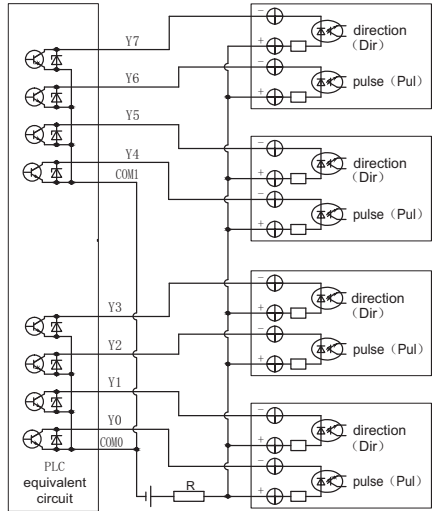


Diagram 14 Pulse output wiring diagram

※ Note: The internal circuit in all diagrams is for reference only

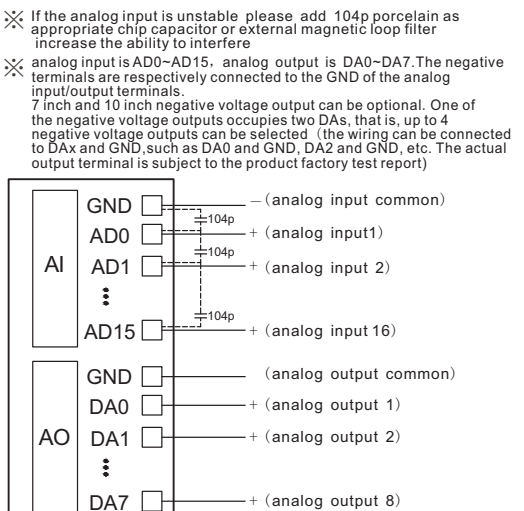


Diagram 15 PLC analog wiring

### PLC analog wiring

Two-wire system: the positive pole of the power supply is connected to the positive pole of the transmitter; the negative pole of the transmitter is connected to the AD side; the negative pole of power supply is connected to GND, which normally it is wiring way of 4-20mA/0-20mA transmitter  
 Three-wire system: the positive pole of the power supply is connected to the positive pole of the transmitter; the negative pole of the power supply and the negative pole of the signal output are the same terminal and transmitter signal output is connected to the AD terminal;  
 Four-wire system: the positive and negative poles of the power supply are respectively connected to the positive and negative poles of the transmitter, and the positive and negative poles of the transmitter signal output are respectively connected to the AD and GND terminals;  
 The analog line of the temperature is connected to the AD terminal and the GND terminal respectively, if I is a three-wire PT100, it needs to be connected in two lines. The GND common terminal of the analog input and output can be shared.

### PLC anti-interference processing

1. Strong and weak currents should be separated and wired, and not common ground; when there is strong electric interference, magnetic rings should be added on the power supply side; and properly and effectively grounded according to the type of the chassis.
2. when the analog quantity is disturbed, 104 ceramic capacitors can be added for filtering, and a correct and effective grounding can be performed.

※ Note: more details please refer to <Coolmay >

### Programming Reference

#### ◆ Devices Distribution and Statement of Power-down Save

	QM3G-43FH/50FH-24M	QM3G-70FH/HD-44M	QM3G-70KFH/100FH-60M
max digital points	QM3G-43FH/50FH-24M	QM3G-70FH/HD-44M	QM3G-70KFH/100FH-60M
digital input X	X00~X13 12 points	X00~X27 24 points	X00~X35 30 points
digital output Y	X00~X13 12 points	Y00~Y23 20 points	Y00~Y35 30 points
Auxiliary Relay M	[M0~M383] 384point general / [M384~M1535] 1152point holding / [M1536~M7679] 6144point general		
		[M8000~M8511] 512point special	
State S	[S0~S9] 10point initial state/ [S10~S999] 990point holding/ [S1000~S4095] 3096point general		
		[T0~T199] 200point 100ms general / [T250~T255] 6点 100ms holding	
Timer T	[T246~T249] 4point 1ms grand total holding / [T256~T319] 64 points 1ms general		
		[T200~T245] 46point 10ms General ※The 10ms timer will be affected by the scan period. If the scan period is 12ms, the timer becomes 12ms and executes once.	
Counter C	16bit up counter	32bit up and down counter	high-speed counter
	[C0~C15] 16point General	[C200~C219] 20point General	[C235~C245 single phase single counting]
	[C16~C199] 184point holding	[C220~C234] 15point holding	[C246~C250 single phase dual counting]
			[C251~C255 dual phase dual counting]
Data Register D	[0~D127] 128point general/ [D128~D7999] 7872point Holding/ [D8000~D8511] 512point Special		
Data Register V, Z		[V0~V7] [Z0~Z7] 16point indexing	
Extended file register R	[R0~R22999] 23000points support power outage/[R23000~R23999] 1000points internal use		
pointer JUMP, CALL branch	[P0~P255] 256points/[P0~P1280] 1281 points (26232 version or above)		
Nested Pointer		[N0~N7] 8points Master control	
Interruption	[I0□□~I5□□] 6points input interruption/[I6□□~I8□□] 3points timer interruption/[I010~I060] 6points counter interruption		
constant	K	16bit -32,768~32,767	32bit -2,147,483,648~2,147,483,647
	H	16 bits 0~FFFFH	32bits 0~FFFFFFFFH

#### ◆ Analog input register(AD means analog input precision is 12 bit) ; supports FROM instructions or register direct assignment operation

FROM instruction can read directly: FROM K0 K0 D400 K16, reads 16 channel analog input.  
 register read directly: D[8030]-D[8045] is the input value corresponding to the analog quantity [AD0~AD15]. The constant scan time is changed to D8059, which is started by M8039 (this function is available on version 26232) when the analog input has thermocouple type You can only do up to 15 channels, of which AD4 (D8034) is the ambient temperature of the thermocouple. You can do 16 channels without the thermocouple type.)  
 ※ The temperature type is one after the decimal point is reserved, like 18.2°C=18.2  
 ※ Note: The analog input range and the corresponding value of the register can be found in <Coolmay QM3G-FH Series All-in-one Programming Manual>

#### ※ Sampling of analog inputs

The number of filtering cycles = (R23600 ~ R23615) \* PLC scan time, the default is 100, the data can not be less than or equal to 0. If RS23600 = 1, a PLC scan cycle is sampled once, and the first analog input is changed once. The larger the value of R23600~R23615 is set, the more stable the result is.  
 D8073 is the smoothing filter coefficient of all analog inputs. Setting range: 0~999

#### ◆ Analog output register(DA means analog output, precision is 12 bit); support TO instructions or register direct assignment operation

TO instruction direct output: TO K0 K0 D500 K8, output 8 channels analog  
 Register direct assignment operation: D[8050]-D[8057] corresponding to the analog output value of [DA0~DA7], which optional two-way DA is used when the negative output is selected, the set value range is as follows

Serial No.	register address	setting range	output type
DA0	D8050	0-4000	when D8058.0~D8058.7=0 type is 0~20mA;
DA1	D8051	0-4000	
DA2	D8052	0-4000	
DA3	D8053	0-4000	
DA4	D8054	0-4000	when D8058.0~D8058.7=1 type is 4~20mA.
DA5	D8055	0-4000	
DA6	D8056	0-4000	
DA7	D8057	0-4000	

HMI PLC All-in-one's device power-off maintenance is permanently maintained, that is, all the devices in the holding area are not lost after the module is powered off.

The real-time clock uses a rechargeable battery to ensure that the clock is the current time. All power-off hold functions must ensure DC 24V. The voltage after the source is loaded is 23V or more, and the PLC power-on time is longer than 2 minutes, otherwise the power-off function will be abnormal.

programming software PLC: compatible with PLC programming software GX Developer 8.86Q and GX Works2  
 HMI: mView HMI programming software

Detailed refers to <Coolmay QM3G-FH series HMI PLC All-in-One Programming Manual> <Coolmay QM3G-FH series All-in-One User Manual> <Coolmay TK series HMI User Manual> <FX3G series PLC Programming User Manual>

Tips

### QM3G-FH series HMI PLC All-in-One User Manual

— Before using this product, please read the relevant manual  
 Carefully use the product under the environmental conditions specified in the manual.

1. In case of damaging the product, please confirm power supply range first (the regular power supply only limited to 24V DC, we suggest you to use the power supply which output voltage is 18W or higher than 18W), and wiring correctly, then electrify it.
2. Before installing the product, please tighten the screw and clamp guide to avoid falling.
3. Please do not wiring or plug cable when the power is on, otherwise it may cause electric shock or circuit damage. Disconnect the power switch immediately when the product smells or sounds abnormal. Do not drop metal shavings and wire tips into the control vent holes during screwing hole and wiring, which may cause product malfunctions and faults.
4. Please do not tie the power cord and communication cable together or let them too close, you should keep them for more than 10cm distance. The strong and weak electricity should be separated and properly grounded. If the interference is serious the communication and high frequency signal input and output cables should be the shielded cables to improve anti-jamming performance.
5. The digital input is an externally powered DC24V leakage type (passive NPN) with the input signal isolated from the power supply. When you use it, you need to connect COM to the 24V positive pole of the external power supply
6. The COM of the binary input/output (transistor) is common to the cathode.
7. Do not disassemble the product or modify the wiring optionally. Otherwise it may cause fault, malfunction, loss, or fire.
8. Please make sure to turn off the all power when you install or dismantle the product, otherwise it may cause malfunction or fault.

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