

# EX3G HMI PLC All-in-One User Manual

Thank you for purchasing Coolmay EX3G HMI PLC All-in-One products. This manual mainly explains the product features, specifications and wiring methods. Detailed PLC programming, please refer to "Coolmay EX3G HMI PLC All-in-One Programming Manual". Detailed HMI part, refer to "Coolmay HMI Programming Manual". The features are as below.

- Super functions.
- Its PLC is compatible with FX3G, FX3U, FX3S. It operates fast.
- Highly integration.
- 1. 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 Mini B-type USB port), 1 downloading port and 1 USB port on HMI. 2. The PLC part of models 70KH, 100HA all-in-one can optionally select one 485 port or two 485 ports
- (one is changed from existed 232 port), CAN, network port (not coexist with the one on HMI), Wifi (will cover the existed 232 port). The HMI part can optionally select one RS232 or one RS485, and network port (not coexist with the one on PLC).
- 3. The PLC part of models 43H(HB), 50KH can optionally select two RS485, and HMI part can select one RS232. • Support several high-speed counting and high-speed pulse.
- 1. Commonly high-speed conting is 6-channel single phase 60KHz or AB (Z) 2-channel 60KHz plus 1 channel 10KHz.
- 2. High-speed pulse is commonly 8 channels, HB series Y0-Y7 10KHz per channel, H/HA/KH series Y0-Y3 is 100KHz, Y4-Y7 is 10KHz. Acceleration and deceleration are independent. 3. The total high-speed counting and pulse can not exceed 480KHz.
- 32K steps program capacity, 32K power-off retentive registers, support interrupt, linear and circular
- interpolation, PID self-adjusting.
- Special encryption.
- t password as 12345678 to thoroughly prevent reading data. (PLC only supports 8-bit password encryption) • PLC is compatible with programming software GX Developer 8.86Q and GX Works2, and HMI is
- Coolmay HMI programming software.
- More models are supported to customize if bulk order.

#### **Product Details**

- ◆ Naming rules EX3G 43HB- 24 M RT- 4AD 2DA V A0 1C1 -1P 485P/232H 2 10 1
- 3 4 5 6 7 8 9 1. Series EX3G
- 2. HMI
   43HB/43H: 4.3"
   50KH: 5"
   70KH: 7"
   100HA: 10"

   3. Digital input and output (DI/DO)
   16(8DI/8DO), 24(12DI/12DO), 44(24DI/20DO), 60(30DI/30DO), etc.

   4. Module type
   M- Main module of universal controller

- Bigital output (DO) type R- relay T- transistor RT- both relay and transistor
   Analog input (AD) 4 channels for 43H(HB)/50KH, 12 for 70H, 16 for 70KH/100HA
   Analog output (DA) 2 channels for 43H(HB)/50KH, 8 for 70H/70KH/100HA
- E: Thermocouple E (can be customized as type K, T, S or J, supports negative temperature), PT: PT100, PT1000; PT1000, NTC: thermistor 10K, 50K, 100K A0: 0-20mA A4: 4-20mA V: 0-10V V5: 0-5V 8. Al type
- V5 : -5V~5V V : -10V~10V (only 7 and 10 inch support V5 and V) A0- 0-20mA A4- 4-20mA V- 0-10V V5- 0-5V V5 : -5V~5V V : -10V~10V 9. AO type (only 70KH/100HA support negative voltage, covers 2 channels)
- C1- singe phase high-speed counting, C2- AB phase counting, C3- ABZ phase counting, Commonly for HB series, it is 6 single 10KHz, or 3 AB 10KHz, or 2 ABZ 10KHz + 1 AB 10KHz.
- H/KH/HA series can be 6 single phase 60KHz, or 2 AB(Z) 60KHz + 1 AB 10KHz.
- PO-high-speed pulse 10KHz; P-high-speed pulse; Commonly 8-channel, HB series Y0-Y7 10KHz per channel; H/KH/HA series Y0-Y3 is 100KHz, Y4-Y7 is 10KHz; That high speed counting plus high speed pulse must be within 480KHz
- 12. Optional COM port, refer to "Chart 1: basic parameter"

## Basic parameter

<ul> <li>Basic parameter</li> </ul>								Cha	art 1: bas	ic paramete
Specifications of HMI PLC All-in-One		gital ints	Analog points (optional)		COM port (optional)		High-speed counting (optional)			High-speed pulse (optional)
		DO	AD	DA	HMI	PLC	Single phase	AB phase	ABZ phase	Output
EX3G-43HB(H)/50KH-16M	8	8	4	2	Ð	ort xisted 232), ith the one 22 port)	H/KH/HA:	H/KH/HA: 2-channel 60KHz and 1-channel 10KHz	H/KH/HA: 2 ABZ 60KHz HB: 2 ABZ	8 channels.
EX3G-43HB(H)/50KH-24M	12	12	4	2	vith th		6-channel 60KHz HB: 6-channel			:1/KH/HA: Y0-Y3 is 100KHz, Y4-Y7 is 10KHz
EX3G-70H-16M	8	8			ort. exist v					HB:
EX3G-70H-24M	12	12	12 8		1, co	485 po or the e xist w ted 23	10KHz.	HB: 3-channel	10KHz.	YU-Y7 is 10KHz per channel.
EX3G-70H-38M	20	18	1		1, 1x 2 11 (ca 11 (ca	EX3G 43HB/43H/50KH: 2X- EX3G-70KH/100Ha: 1x 485 EX 485 (nom is changed from EX 486 (nom is changed from Can't coe AN network port (can't coe on HMI), Wifi (cover the exis		TUKHZ.		Acceleration and
EX3G-70H-44M	24	20	8	6	755K 75€ g					independent.
EX3G-70KH/100HA-16M	8	8	16	8	143H/ 100F					High-speed counting and pulse
EX3G-70KH/100HA-24M	12	12	16	8	PLC) - 10					480KHz.
EX3G-70KH/100HA-44M	24	20	16	8	6 85 10 X					
EX3G-70KH/100HA-60M	30	30	5	2	шш 2 2					
43HB (H)/50KH: MT is MOS output, max load 2A. 70H/70KH/100HA: MT is transistor output (Y0-Y3 are MOS outputs) with max load 500mA MR is relay output with max load										

load 500mA. MR is relay output with 5A. MRT is mixed 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 $4.3\Omega$				

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, defaulted as 10ms
High-speed counting	Commonly for HB series, it is 6 single 10KHz, or 3 AB 10KHz, or 2 ABZ 10KHz + 1 AB 10KHz. H/KH/HA series can be 6 single phase 60KHz, or 2 AB(Z) 60KHz + 1 AB 10KHz.
Input level	Sink NPN, com isolation, S/S
	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	10 million 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 $\mu$ s, and others 0.5ms
High-speed output frequency	8 channels. HB series Y0-Y7 10KHz per channe. H/KH/HA series Y0-Y3 100KHz, Y4-Y7 10KHz. Acceleration and deceleration are independent.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/-10V^10V/-5V^5V/0-20mA/4-20mA/ customizations.
Response time	1 scanning cycle
Analog input	0-16 channels
Precision	12 bits
	Analog output indexes
Output signal	0-5V/0-10V/-10~10V/-5~5V/0-20mA/4-20mA/customizations
Analog output indexes	0-8 channels
Precision	12 bits
	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, 4.9m/s² (10 times each on X, Y, Z, total 80 minutes each)

# **Mechanical Design**



\*More models are supported to customize if bulk order.

#### \* More specs can be customized if bulk order

Model	Max dig point
EX3G-43HB	12DI/120
EX3G-50KH	12DI/120
EX3G-70H	24DI/200
EX3G-70KH	30DI/30E
EX3G-100HA	30DI/30E

## Electric Design

# Product structure



EX3G-43HB/H





EX3G-100HA

# Hardware Interface





Wiring specifications of terminals: 22-14AWG wire. The terminals of this serial are all pluggable ones.

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



- 🖬 🐵 🖘 🖻

Graph 6 EX3G-100HA

FG 0V 24V

PLC programming port (optional RS485/WiFi)

00

USB port/optional SD card

Network port (optional

HMI download port

											Chart 4	Pin a	etinition
EX3G-43HB/43H/50KH all-in-one COM EX3G-70H/70KH/100HA all-in-one COM(EX3G-70H can't support WIFI)									t WIFI)				
COM1 DB9 port	Optional and default 232 cannot coexist	Optional	Default	Optional	cc	COM2(DB9 port near power supply)				COM1(DB9 port away from power supply)			Network port
PIN#	PLC-485-2 serial port 3	PLC-485-1 serial port 2	PLC-232 serial port 3	HMI-232	Db9 port	Optional	Optional and default 232, Optional WIFI	Default	Optional and default 232. Optional 485	Optional	Optional	Optional	Optional
1	√(485+)				PIN#	PLC-485-1 serial port 2	PLC-485-2 serial port 3	PLC-232 serial port 3	WIFI	PLC-CAN	HMI-485	HMI-232	Network
6	√(485-)				1	√(485+)					√(485+)		port of HMI and
2			√(RXD)		6	√(485-)					√(485-)		PLC do not occupy
3			√(TXD)		2			√(RXD)	√			√(RXD)	serial port
5			√(GND)	√(GND)	3			√(TXD)	√			√(TXD)	and can
4				√(TXD)	5			√(GND)	V			√(GND)	not coexist.
7				√(RXD)	4								
8					7								
9					8		√(485+)		V	√(H)			
Terminal 485		√			9		√(485-)		V	√(L)			

\* Note: Detailed settings, please refer to "Coolmay EX3G 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.



Figure 6 Input wiring

#### PLC digital inputs wiring:

- Ports short circuit: S/S of PLC input terminal is connected to 24V. X terminal is connected to power supply 0V. i.e., input 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): Sensor or encoder power supply is connected to power supply positive signal line is connected to X terminal Encoder and photoelectric sensor are NPN type (PNP is customized)
- 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: Dry contact output, COM can be connected to the positive or negative

Figure 7 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups and each group is electrically isolated. Different groups of output contacts are connected to different power circuits.





Y007

sinker output

Figure 8 Equivalent circuit of transistor output

The equivalent circuit of the transistor PLC output is shown in Figure 8. Seen from the figure, the output terminals are several groups, and each group is electrically isolated, and different groups of output contacts can be connected to different power circuits. The transistor output can only be used for DC 24V load circuits. Output wiring is NPN, COM cathode.

For the inductive load connected to the AC circuit the RC transient voltage absorption circuit should be considered on the external circuit. For the inductive load of the DC loop, adding a freewheeling diode should be considered, as shown in Figure 9.

Stepping or servo motor wiring is shown in Figure 10. 3G series PLC defaults Y0-Y7 as pulse points, and the direction can be customized.

Note:5V drive must connect a 2KΩ resistor on DC24V.





Figure 10 Pulse output wiring

PLC analog wiring

output can be shared.

Max digital points

DI X

DO Y

Auxiliary relay M

Status S

Timer T

Counter C

Data register D

Data register V.Z

Extended file register

pinter JUMP,CALL branch u

Nested pointer

Interruption

Consta

к

н

PLC anti-iamming processing

grounding can be performed.

Programming reference

according to the type of the chassis.

X Note: All internal circuit in the figure are taken as reference

output is connected to the AD terminal

EX3G-43HB/43H/50KH-24M

X00-X13 12 points

Y00-Y13 12 points

[C235-C245 sinc

\* Please consider adding 104p ceramic capacitor or external magnetic ring filter to increase anti-interference ability if analog inputs are unstable.

\* Analog input is AD0-AD15 and output is DA0-DA7. Negative terminals are connected to GND of input and output respectively. One negative voltage output will occupy 2 DA and max 4 negative oltage outputs can be optional. (Only connect DAx and GND. Please be subject to the test report in your package.





Two-wire system: The positive pole of the power supply is connected to that of the transmitter, and the negative

Three-wire system: The positive pole of the power supply is connected to that of the transmitter. The negative of

Four-wire system: The positive and negative terminals of the power supply are connected to those of the

connected to the AD and the GND terminal respectively

pole of the transmitter is connected to the AD side, and the negative pole of the power supply

is connected to the GND. Generally it is the wiring method of the 4-20MA/0-20MA transmitter

the power supply and that of the signal output are the same terminal. The transmitter signal

EX3G-70H-44M

X00-X27 24 points

M0-M383] 384 points, general / [M384-M1535] 1152 points, maintain/ [M1536-M7679] 6144 points, general/

[M8000-M8511] 512 points, special

[S0-S9] 10 points original state/ [S10-S999] 990 points, maintain/ [S1000-S4095] 3096 points, general

[T0-T199] 200 points, 100ms, general / [T250-T255] 6 points, 100ms, maintain,

[T246-T249] 4 points, 1ms accumulation, maintain / [T256-T319] 64 points, 1ms, general use/

[T200-T245] 46 points, 10ms, general use/

\* 10ms timer is affected by scan cycle. If scan cycle is 12ms, the timer will work every 12ms.

16 bits increase counter(CTU)/32 bits increase and decrease counter (CTUD)/High speed counter

[D0-D127] 128 points, general / [D128-D7999] 7872 points, maintain / [D8000-D8511] 512 points, special use

[V0-V7] [Z0-Z7] 16 points, used while modifying address

[P0-P255] 256 points/ [P0-P1280] 1281 points (26232 and higher version)

[1010 ~ 1060] 6 points, timer interruption use

16 bits -32,768-32,767/32 bits -2,147,483,648-2,147,483,647

[10==~15==] 6 points, input interruption use/ [16==~18==] 3 points, timer interruption use/

16 bits 0-FFFFH/32 bits 0-FFFFFFFH

[N0-N7] 8 points, master use

[R0-R22999] 23000 points, support power retentive/ [R23000~R23999] 1000 points, system internal use

[C0-C15] 16 points, genera use/[C16-C199] 184 points, maintain use/ [C200-C219] 20 points, general use/[C220-C234] 15 points, maintain use/ nase single count], [C246-C250 single phase double count], [C251-C255 double phase double count]

Y00-Y23 20pints

transmitter respectively, and the positive and negative of the transmitter signal outputs are

chart below.

※ AD sampling

DA2 DA3 DA4 DA5 DA6 DA7

No

DA1

The soft elements power retentive of HMI PLC all-in-one is permanently retentive, i.e., all the soft elements in the holding area are not lost if the module is powered off. The real-time clock uses a rechargeable battery to ensure that the clock is the current time. All power retentive functions must ensure that the voltage is 23V or higher when DC24V power supply with loads, and the PLC power-on time is longer than 2 minutes. Otherwise, the power retentive functions will be abnormal

\* Programming software HMI: Coolmay HMI programming software

\* Detailed information please refer to "Coolmay EX3G HMI PLC All-in-One Programming Manual". "EX3G HMI PLC All-in-One User Manual" "Coolmay HMI User Manual"



- - 6. DO (transistor) COM is common cathode.

  - breakdown, malfunction, loss, or fire,
  - malfunction and breakdown
  - Shenzhen Coolmay Technology Co., L Tel.: 0755-86950416 86960332 26051858 26400661 Fax: 0755-26400661-808

QQ: 1687435500

Email: m3@coolmay.com

Website: https://en.coolmay.com/

#### Analog input register (AD, accuracy 12 bits), Support FROM demand or register read directly. FROM demand read: FROM K0 K0 D400 K16 can be read as 16-channel analog inputs

Registers read directly: DI80301-DI80451 are the input values of [AD0~AD15]. The constant scan-time will change to D8059

and started by M8039 (version 26232 and higher). It supports max 15 analog inputs when there exist thermocouple type, and AD4[D8034] is the ambient temperature of thermocouples. It supports max 16 analog inputs without thermocouples.

#### % The temperature type is one digit after the decimal point, i.e. 182 = 18.2 degrees

X Note: Analog input range and register values, please refer to "Coolmay EX3G HMI PLC All-in-One Programming Manual".

Version: 2021/06

# The two wires of the temperature analog are connected to the AD and the GND terminal respectively. If it is a three-wire PT100, it needs to be connected in two lines. The GND common terminal of the analog input and 1. Strong electricity and weak electricity should be separated wiring and not common ground. When there is strong electric interference, add magnetic ring on the power supply. And do correct and effective grounding



EX3G-70KH/100HA-60M

X00-X35 30 points

Y00-Y35 30 points

Filter cycles = (R23600~R23615)\* scan time of the PLC. The default value is 100 and the data cannot be less than or equal to zero. If R23600=1, one PLC scan cycle samples once, and the value in 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. The setting range is 0~999

### Analog output register (DA, accuracy 12 bits). Support TO demand or direct register assignment. TO demand direct outputs: TO K0 K0 D500 K8, 8 analog outputs

TO demand direct outputs: D[8050]~D[8057] correspond to the values of [DA0~DA7]. When select negative outputs, 2 analog outputs will be covered. The configuration is as the

Register address	Range of set value	Output type
D8050	0-4000	
D8051	0-4000	If D8058 0~D8058 7=0
D8052	0-4000	output type is 0-20mA.
D8053	0-4000	
D8054	0-4000	If D8058 0~D8058 7=1
D8055	0-4000	the type is 4-20mA.
D8056	0-4000	
D8057	0-4000	

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

# EX3G HMI PLC All-in-One User Manual

- Please read carefully the related manuals before using our products, and use this product under the environmenta conditions specified in this manual.

1. Power on after confirmed the voltage (24VDC, >18W) and right wiring to avoid damage. 2. Tighten the screws or the rail while mounting the product to avoid falling off.

3. Avoid wiring or plug the cable with electricity, or it is easy to cause electric shock or circuit damage. When the product emits odor or abnormal sound, please immediately switch off the power. While processing screw holes or wiring, do not drop the metal chips and wire head into the ventilation hole of the controller, which may cause product failure and disoperation. 4. Do not tie power cables and communication cables together or close and keep them at a distance of 10cm or more. Strong and weak currents need to be separated and correctly grounded. In severe interference situations, input and output cables of the communication and high-frequency signals should use shielded cables to improve anti-jamming performance. The grounding terminal FG on this unit must be properly grounded to improve the anti-interference

5. DI is an externally powered DC24V sinker (passive NPN), and the input signal is isolated from the power supply. Connect S/S to 24V of external power supply while using.

7. Please do not disassemble the product or change the wiring. Or it will possible to cause

8. While installing or disassembling the product, ensure to turn off all power. Or it may cause

# Catalog

_td	Tips	01
	Product Features	02
	Product Information	03
	Electric Parameter	04
	Mechanical Design	05
	Electric Design	06
	Equivalent circuit	07
	Analog Wiring	
	Anti-interference Processing	09
	Programming Reference	10
	Data Reference	11

Any updates will be updated on our website:en.coolmav.com

Figure 7 Equivalent circuit of relay output