CHCD series artificial intelligence controller

Widely used in temperature, humidity, pressure, flux, weight, water pressure automation control system

Instruction manual

I. Summarize

1. Features

- Internal digital correction system for input. Support thermocouple, RTD or linear signal input. Max accuracy 0.01
- Adopting advanced PI artificial intelligence algorithm, without overshoot. The controller is provided with automatic regulation function.
- Adopting advanced modular structure. Supplying various output Specifications, which could meet variety of applications. Easy maintenance.
- Adopting humanized designed operation, easy to learn and easy to use.
- Allow user to modify the authority of all parameters, including check and amend.
- Be applicable with universal AC 85~256V or DC 24V power supply. And have a variety of dimensions for customers to choose.
- The controller meets the EMC standard.

Notes:

- This manual(V8.9) is about CHCD series artificial intelligence controller, and may partly isn't applicable with other version. Trademarks and software version number will be displayed on the display windows when electrified. Users should pay attention to the differences between software versions. Advised to carefully read the user manual for the correct use and bring into full play the function of this instrument.
- CHCD series controller must be set correctly of input and output specification parameter. Only after the parameters are correctly set, this instrument can be put into use.

2. Model Definition

CHCD series controller hardware adopts advanced modular design. An CHCD series controller could be installed maximum 5 modules, Module Types are up to 20 kinds. User can quickly customize the special function module for the special requirements. CHCD+P is provided with 10 program segments functions. instrument input mode can be freely set to thermocouple, thermal resistance and linear signal (current). Output, alarm and communications are using modules, the module can be purchased separately with the instrument, free combination. CHCD series controller's model number comprises a total of nine components, such as:

CHCD 100 □ □ □ □ □□□□ □ □

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

The meaning of the upper 9 segments as the following:

① Code of the controller series number

② Code of the controller's panel size

100: panel size 48×48mm, slot size 45×45mm, depth 90mm
400: panel size 48×96mm, slot size 45×92mm, depth 90mm
401: panel size 96×48mm, slot size 92×45mm, depth 90mm
700: panel size 72×72mm, slot size 68×68mm, depth 90mm
900: panel size 96×96mm, slot size 92×92mm, depth 100mm

③ Control mode: (**Blank:** single loop; **P:** multi-segment function)

④ Main output mode: (**F:** heating; **D:** refrigeration; **F/D:** heating/refrigeration; **T:** transmitting)

⑤ Sensor type: (Please refer to SN parameter, for example **0** means type K thermocouple input)

⑥ Main output module: (**G:** SSR; **X:** linear current; **L2:** small capacity relay; **L4:** large capacity relay; **K1:** single phase SCR zero-cross; **K3:** three phases SCR zero-cross; **K5:** single phase-shift SCR)

⑦ AUX output logic, about alarm output. For sensor power please declare: (**N:** none AUX output; **A:** lower deviation; **B:** higher deviation; **H:** high limit; **L:** low limit; **D:** within range)

⑧ Communication: (**N:** no communication function; **S:** free protocol; **M:** Modbus protocol)

⑨ Power supply: (**Blank:** 85~265VAC ; **24:** 24V DC/AC)

3. Module socket and usage

(1) Module socket definition

CHCD series support maximum 5 output module (CHCD700 has three sockets: OUTP, AUX, COMM/AL1; CHCD100 has only 2 sockets: OUTP, COMM/AUX). It has different functions by installed vary modules.

Socket MIO: can be installed by 24V/12V/5V power supply for sensor; by X module for transmitting output or 4~20mA; by K3 with OUTP socket for three phases SCR zero-cross.

Socket OUTP: as output of ON-OFF mode, PID mode or APID mode, can be transmitting output of setting value or measuring value; can be installed by L2 or L4 for relay contact output; by X module for 0~20mA/ 4~20mA linear current output; by G module for SSR output; by W1 tor SCR output.

Socket ALM: can be installed by L4 or L2 for NO/NC alarm relay output(AL1); by L5 for two NO alarm relay outputs(AL1+AL2).

Socket AUX: can be installed by L4, L2 or L5 module for alarm output(s).

Socket COMM: can be installed by S module(RS485 communication) for communicating with upper instrument; by 24V/12V/5V module for external sensor power supply.

(2) Installation and replacement

Modules can be pre-installed by us if you declare applications. We will also preset the parameters for you. If it is necessary to repair or change its function, user can install modules themselves. Pay attention to update the parameters in order to match hardware changes.

II. Technical specification

● Input specification :

Thermo-couple： K、S、R、E、J、T、N； Thermal resistance： Cu50、Pt100； Linear voltage: 0~5V、1~5V、0~1V、0~100mV、4~20mA etc.； Linear current (need external shunt resistor): 0~10mA、0~20mA、4~20mA etc.; Expansion： allowing users to specify an additional type specifications (Graduation form is necessary)

● Measuring range :

K（-50~+1300℃）S（-50~+1700℃）T（-200~+350℃） E（0~800℃） J（0~1000℃） N（0~1300℃）Cu50（-50~+150℃） Pt100（-200~+600℃）

Linear input： -9990~+30000(definable) Accuracy: 0.25%F.S. 1 measure digit

Sampling cycle: 8 times/second (dL=0), respond time <0.5 second

Control cycle: 0.2~300.0 second

EMC: IEC61000-4-4, 4KV/5KHz; IEC61000-4-5, 4KV

Isolation voltage: between power, relay, input ends ≥2300V； week signals ≥600V

Power supply: 100~240VAC, -15%, +10% 50/60Hz ; Or 24VDC/AC, -15%, +10%

Power consumption: <5W

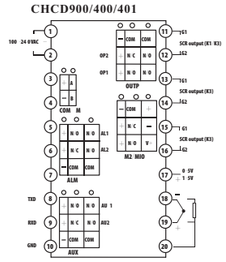
Working environment: 0~60 degree C; <90RH

III. Connection

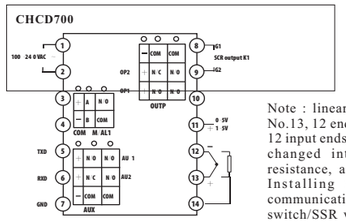
Instrument back cover connection diagram as follows :

Note : linear voltage (range below 1V) attach No.19, 18 input ends; linear voltage 0~5V and 1~5V attach No.17, 18 input ends. 4~20mA linear current signal could be changed into 1~5V voltage signal by 250Ω resistance, and then attach No.17, 18 input ends, could also install I4 module in MIO and then wiring No.14+, 15- input ends. Or directly attach No.16+ and No.14 with two-wire transmitter. Because different thermocouple adopts different compensation wire, when you use inner automatic compensation mode, you should attach the compensation wire on the connection ends of back cover, and should not replaced the wire with common wire, so as to avoid measuring errors.

CHCD900/400/401

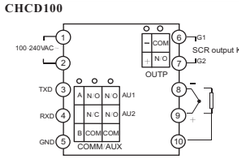


CHCD700



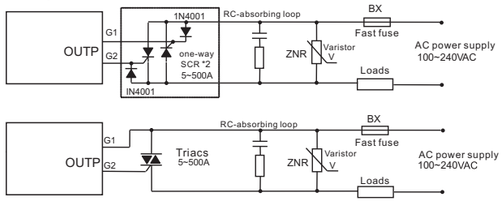
Note : linear voltage (range below 500mV) attach No.13, 12 ends. 0~5V and 1~5V signal attach No.11, 12 input ends. 4~20mA linear current signal could be changed into 1~5V voltage signal by 250Ω resistance, and then attach No.11, 12 input ends. Installing S or S4 module on COMM for communication, while installing relay/non-contact switch/SSR voltage output module for AL1 alarm output.

CHCD100



Note : CHCD100 controller doesn't support 0~5V or 1~5V linear signal input. If it is necessary, user should attach an external precision resistance to change the signal into 0~500mV or 100~500mV signal. 4~20mA linear input signal should be changed into 100~500mV signal by 25Ω resistance, and then attach No.9, 8 input ends.

Install S or S4 module on COMM for communication function. In another way, install L2 relay module, for AU1 alarm output. Installing L5 Dual normally-open relay output module, and set bAud parameter as 0, for AU1 and AU2 alarm output (only has normally-open output end); Set bAud as 2 for Au1 and Al1 alarm output; Or install L2, L4, G, K1, W1, W2 for BI-direction control(X module is not supported by AU1 or AU2) Installing I2 module and setting bAud parameter as 1, users could achieve shift between SV1/ SV2 (CHCD series) or run/stop functions (CHCD- P) .

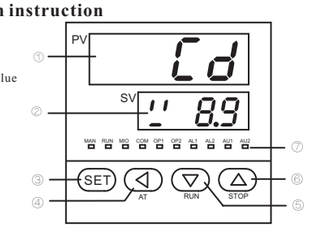


Note : 1. To choose varistor for SCR protection according to Loads' voltage and current. If Loads is inductive or phase-shift trigger, RC absorb capacity is necessary. 2. Recommend adopting SCR power module, a power module contains two one-way SCR, as shown in the dotted line area. 3. If AC power supply range is 220~380V, the power frequency should be 50Hz when adopting K5/K6 phase-shift output module.

IV. Panel instruction and operation instruction

1. Display state

①Upper display window, PV, parameter name
②Lower display window, SV, alarm code, parameter value
③SET press-key, enter menu, confirm button
④Data shift press-key
⑤Devalue press-key (and run/pause operation)
⑥Increment press-key (and stop operation)
⑦10 LED indicator lights, which MAN light is not used in this series; when PRG light is On the program is running; MIO, Op1, OP2, AL1, AL2, AU1, AU2 etc. for input, output, alarm, AUX. When COM light is on, the communication function is running.



After electrified, the controller enter state ①, upper display window displays measuring value (PV), lower display window displays given value (SV). This is the basic state of the controller. In this state, SV window could represent the system's states by alternate characters. As follows :

(1)When input measuring value is out of measure range,(maybe as a result of wrong sensor type, input circuit open or short) the window blinks `orAL`. The controller would stop and set output parameter as 0 automatically.

(2)When alarm occurs display window appears `CHAL`,`CLAL`,`dHAL`and`dLAL` for higher limit, lower limit, higher deflection and lower deflection alarms.

(3)For CHCD+P, character blinks means the controller's running. When program is in stop, pause and ready states, it will blink `StoP`,`HoLd` and `rdy`.

NOTE: Users could cancel flashing alarm ② function to avoid flash too much. Refer to ALS parameter.

2. Basic operation

Parameter setting

In basic display state, press and hold SET for 2 seconds to enter field parameter setting menu. Press ◁ , ▽ , △ etc. to modify. Press ▽ to decrease value; press △ to increase value, decimal point of the value that being modified blinks at the same time(like cursor). Press and hold the buttons for faster setting. Users could also determine amend location (cursor) by pressing ◁ ,more convenience. Press SET to save current parameter value and turn to next parameter. Press and hold ◁ can return to previous parameter. Press and hold ◁ and then press SET at the same time to save setting and back to basic display state. If there is no operation in about 25 seconds, the instrument will back to basic display state automatically.

Fast operation

To set given value (SV, setting value), Press ◁ to enter given value setting. Press ◁ , ▽ and △ to modify.

To start control RUN, Press and hold ▽ for 2 seconds until lower window display 'run'.

To stop control STOP, Press and hold △ for 2 seconds until lower window display 'StoP'.

Auto tune AT: Press and hold ◁ for 2 seconds, At parameter turn out. Press △ to modify OFF to On of lower window. And then press SET to start auto tune.(Note: if SPr parameter is valid and system is during ramp process, auto tune will hold until temperature rise process finish.). During auto tune, lower window displays 'At'. After two ON-OFF controlled temperature rise and decline cycles, the instrument can calculate a set of PID parameters. If user want to stop auto tune process in advance, press and hold ◁ for 2 seconds again, and modify On to OFF of lower window. If instrument is during process running(CHCD+P), auto tune process will make internal timer stops to ensure given value unchanged. If the instrument is used in heating/refrigeration Bi-direction system, PID auto tune should be separated. When auto tune is started during AUX refrigeration output process, P2, I2, d2 parameters are involved instead.

CHCD series' parameter menu can be customized by users in order to protect important parameter from being wrongly set. We call the selected full authority parameter 'field parameter'. Field parameters are a user definable gather of all parameters. Which can be easily to get and modify. While complete parameter sheet is hidden and can be visited only for password holder. Parameter LCK enable CHCD series instrument to have different authority, as follows:

V. LCK(parameter lock) and field parameter

LCK=0, field parameters are adjustable, all kind of fast operation is allowed.
LCK=1, field parameters are adjustable, fast operation is partly allowed (SV value setting, process value setting like time and temperature), but fast operation of RUN/ STOP/ Fixed set point control/Auto tune is forbidden.
LCK=2, field parameters are adjustable, fast operation is partly allowed(RUN/STOP/Fixed set point control), but fast operation of SV value setting process value setting and auto tune is forbidden.
LCK=3, field parameters are adjustable, all kind of fast operation is forbidden.
LCK=4~255, all parameters locked, except LCK parameter itself. All kind of fast operation is forbidden.

Set LCK=password (password can be set between 256~9999, default password is 909) and press to enter full parameter sheet. User has full authority to modify all system parameters.

Definition of EP1~EP8 parameters.
EP1~EP8 are eight parameters correspond to user defined field parameters. If there less than eight parameters are needed, user can set the last EP parameter as nonE. For example, we want to open the authority of HIAL, HdAL and At parameter as field parameter. Easily to set EP1=HIAL, EP2=HdAL, EP3=At, EP4=nonE.

VI. Function and parameter Setting

Parameter Code	Signification	Instruction	Setting Range
CHAL	high limit alarm	The controller alarms when measuring value larger than CHAL value. When measuring value smaller than (CHAL-bd1), alarm release. Every alarm can be defined to control AL1, AL2, AU1, AU2 output port. Refer to AP parameter below.	-999~ +32000 unit
CLAL	low limit alarm	The controller alarms when measuring value smaller than CLAL value. When measuring value larger than (CLAL+bd1), alarm release. CHAL and CLAL can be set to be deviation alarm, refer to CF parameter below.	
dHAL	higher deviation alarm	The controller alarms when deviation (PV - SV) is larger than dHAL. When deviation is smaller than dHAL-bd1, alarm release. Set dHAL as maximum value to cancel this alarm	
dLAL	lower deflection alarm	The controller alarms when deviation (PV - SV) is smaller than dHAL. When deviation is smaller than dHAL+bd1, alarm release. Set dHAL as minimum value to cancel this alarm dHAL and dLAL can be set to be limit alarm, refer to CF parameter below.	
bd	hysteresis error (clearance)	Hysteresis is used to avoid fluctuations in measurement of input values result in frequent ON/OFF control or alarm occurrence /release.	0~200.0 unit
ALS	Alarm indicator	**OFF:** No symbol on lower window when alarm **ON:** Flashing symbol on lower window when alarm, recommended	
AP	Alarm output definition	AP is a 4-digit defined parameter which to define output ports. Its single-digit corresponds to CHAL; tens-digit corresponds to CLAL; hundred place corresponds to dHAL, kilobit corresponds to dLAL. For example: AP= 3 (dLAL) 3 (dHAL) 0 (CLAL) 1 (CHAL) Every digit value range 0~4. While 0 stand for no output from any ports. 1,2,3,4 correspond to AL1, AL2, AU1, AU2 port. For example, AP=3301, means alarm CHAL outputs from AL1 port; alarm CLAL does not output; alarm dHAL and dLAL output from AU1 port. Note 1: when AUX is Bi-direction system's auxiliary output, alarm defined AU1 and AU2 is invalid. Note 2: if AL2 or AU2 is needed, user can install L5 module on ALM or AUX slot.	0~4444
CtrL	Control effect	**OnoF,** adopting ON/OFF adjust, suitable for less demanding occasions. **APID,** adopting AI artificial intelligence adjust, recommended. **nPID,** standard PID algorithm with Anti-Integral Saturation function **PoP,** change PV into output value directly, make it a transmitter. **SoP,** change SV into output value directly, make it CD+P processor.	
Srun	Running status	**run,** controlling status, run indicator is illume. **StoP,** stop status, lower window flashing display 'StoP', run indicator goes out. **HoLd,** controlling hold status. If time value is not defined (CHCD series or CHCD-P with Pno=0), this status could be the normal status. However, fast operation of RUN / STOP is forbidden. If the instrument is used as processor(Pno>0), this status holds the timer and maintains output. HoLd and RUN indicator light will be flashing displayed on lower window. Fast operation of RUN/ STOP can cancel this hold status. Note: User can not let the instrument enter HoLd status via panel operation. HoLd status can be entered by changing this Srun parameter, Process programming, upper PC command or event input.	
Fd	Positive / Reverse action	**rE,** reverse action, with the stronger input, output tends to decrease, like heating control. **dr,** positive action, with the stronger input, output tends to increase, like refrigeration control. **rEbA,** reverse action, with let off low limit alarm and lower deviation alarm when power on. **drbA,** positive action, with let off high limit alarm and higher deviation alarm when power on.	
At	Auto tune	**OFF,** auto tune (At) function is off. **on,** to start auto tune function for PID and t parameter, it will automatically return to OFF status when auto tune finishes. **FOFF,** auto tune function is off, and forbid panel operation to start auto tune.	
P	Proportional band	To define proportional band of APID and PID control. Note: Generally speaking, user can use At function to get correct P, I ,D and t parameter value. For skilled user, can directly modify these parameters according to experience.	1~32000 unit
I	Integral time	To define integral time of PID control, unit is 1 second, set I=0 to cancel integral effect.	0~9999 second
d	Derivation time	To define derivation time of PID control, unit is 0.1 second, set d=0 to cancel integral effect.	0~3200 second
t	Control cycle	Generally speaking, set t=0.5~3 second when using SSR, SCR or current output. When using relay contact or heating/refrigeration Bi-direction output, in order to avoid frequent action or low accurate control, it is better to shorten control cycle. Better set t=15~40 second, it is advised to set t= derivation time*1/5 to derivation time* 1/10. When using relay output(OP1 or OP2 as rELY), practice t is limited more than 3 seconds. 'At' function can also set t parameter properly. When CtrL is defined as ON-OFF mode, t parameter's definition is delay time of output when power on or lag time of output.	0.2~300.0 second
P2	Proportional time of refrigeration output	To define proportional band of APID and PID refrigeration control. Its unit is the same with PV value.	0~32000 unit
I2	Integral time of refrigeration output	To define integral time of PID refrigeration control, unit is 1 second, set I2=0 to cancel integral effect.	0~9999 second
d2	Derivation time of refrigeration output	To define derivation time of PID refrigeration control, unit is 0.1 second, set d2=0 to cancel integral effect.	0~3200 second
t2	Control cycle of refrigeration output	Generally speaking, set t=0.5~3 second when using SSR, SCR or current output. When using relay output(OP1 or OP2 as rELY), practice t is limited more than 3 seconds. Recommending 20~40 seconds.	0.2~300.0 second
bd	Return difference	To avoid frequent action of relay for ON-OFF control. Definition: for reverse control(heating), when PV is larger than SV, output is off. When PV is smaller than SV-bd, output is on. Definition: for positive control(refrigeration), when PV is smaller than SV, output is off. When PV is larger than SV+bd, output is on.	0~200.0 unit
Sn	Input specification	Sn is used to choose input specification, refer to follows :	0~42

Sn	Specification	Sn	Specification
0	K	1	S
2	R	3	T
4	E	5	J
6	B	7	N
8	WRe-3 Wre25	9	WRe-5 Wre26
10	customized expansion	12	F2 radiation thermostat
15	4~20mA (I4 module in MIO)	16	0~20mA (I4 module in MIO)
17	K (0~300.00 ℃)	18	J (0~300.00 ℃)
20	Cu50	21	Pt100
22	Pt100(-80~+300.00℃)	25	0~75mV voltage input
26	0~80Ω resistance input	27	0~400Ω resistance input
28	0~20mV voltage input	29	0~100mV voltage input
30	0~60mV voltage input	31	0~500mV
32	100~500mV	33	1~5V voltage input
34	0~5V voltage input	35	0~10V
36	2~10V	37	0~20V

dIP	radix point position	Four options: **0; 0.0; 0.00 or 0.000** For thermocouple or RTD input, optional **0** or **0.0** Even user choose option **0**, internal accuracy is 0.1℃ resolution. It is recommended to select option **0** for S type thermocouple. When Sn=17,18 or 22, internal accuracy is 0.01℃ resolution. optional **0.0** or **0.00**	
dIL	display value for minimum input	To define display value when input signal is minimum. Usually used for transmitter.	-999~ +3200 unit
dIH	display value for maximum input	To define display value when input signal is maximum. Usually used for transmitter.	
Sc	main input translation amendment	Parameter Sc is for main input translation amendment, which to compensate the sensor or the input signal error. It can also compensate error from the cold junction of thermocouple. This parameter is normally 0. Wrong Sc parameter value will cause measure error.	-999~ +400 unit
dL	Input digital filter	To define strength of digital filter. The stronger filter value, the slower measuring respond. In condition of big interference, user can increase dL parameter step by step in order to make PV value jump between deviation 2~5 digit. In condition of quantitative detection, user should set dL parameter as 0 or 1 in order to increase measuring accuracy and respond speed. Unit of dL parameter value is 0.5 second.	0~40
Hz	Power frequency & temperature unit	**50C,** power frequency 50Hz, temperature unit is ℃ **50F,** power frequency 50Hz, temperature unit is F **60C,** power frequency 60Hz, temperature unit is ℃ **60F,** power frequency 60Hz, temperature unit is F	
OP1	Output type	**SSR,** for SSR voltage pulse output or SCR zero-cross output, corresponding to G, K1 or K3 module. Cycle is usually 0.5~4 sec. **rELy,** for Relay contact output, Cycle is usually 3~120 second. Recommending to set the output cycle equal to 1/5 to 1/10 of system lag time. **0~20,** for 0~20mA linear current output, corresponding to X module. **4~20,** for 4~20mA linear current output, corresponding to X module. **PHA,** single phase phase-shift output, corresponding to K5 module, but AUX can not be refrigeration output in this mode.	
OP2	Refrigeration output	This parameter is just for AUX port used as refrigeration output. **SSR,** for SSR voltage pulse output or SCR zero-cross output, corresponding to G, K1 or K3 module. Cycle is usually 0.5~4 sec. **rELy,** for Relay contact output, Cycle is usually 3~120 second. Recommending to set the output cycle equal to 1/5 to 1/10 of system lag time. **0~20,** for 0~20mA linear current output, corresponding to X module. **4~20,** for 4~20mA linear current output, corresponding to X module. Note: please set output cycle between 3~120 seconds when OP1 or OP2 is rELy.	
OPL	Output low limit	When OPL is set between 0~100%, this parameter is to define low limit of OUTP in one-way system. When OPL is set between -1~-110%, this parameter is to define output low limit of outputs in Bi-direction system. When Fd is set as rE or rEbA, OUTP port is for heating, and AUX port is for refrigeration. When Fd is set as dr or drbA, OUTP port is for refrigeration and AUX port is for heatting. For Bi-direction system, OPL is defined as limitation of maximum refrigeration output. OPL=-100%, refrigeration is not limited. For linear output(4~20mA), maximum output can beyond 10% of max value. For SSR or Realy output, max refrigeration output should not beyond 100%.	-110~ +110%
OPH	Output high limit	To define limitation of OUTP when PV is smaller than OEF. OPH must be set bigger than OPL.	0~+110%
OEF	Valid range of OPH	When PV is smaller than OEF, high limit of OUTP is OPH. When PV is larger than OEF, output is not limited. Output is100% This parameter is for occasion that need to low output. For example, a heater's output power must be lower than 30% when temperature below 150℃. User can set OEF=150.0(℃), OPH=30(%)	-999~ +3200℃ or linear unit
Addr	Communication address	To define communication address. Valid range 0~80. Please define different address for different instruments in one series.	0~100
bAud	Baud rate	To define baud rate of communication. Valid range 1200~19200 bit/s (19.2K). For CHCD100 or CHCD700, when COMM/ AUX port is used for AUX output, bAud must be set as 0. COMM port can used for event input instead of MIO port when bAud is set as 1. For CHCD100, if bAud=2, COMM can be used for AU1+AL1 output, this enable CHCD-P instrument for event input. Because event input is only defined for AL1 or	0~19.2K

Et	Event input types	**nonE,** do not have event input. **ruSr,** RUN/STOP, MIO triggered, RUN mode starts; MIO is held for 2 seconds, STOP mode starts. **SP1.2,** for given value switch in fixed set-point control(CHCD-P, Pno=0). MIO is open, SV=SP1; MIO is closed, SV=SP2 **Pid2,** for one-way control. MIO is open, using P, I, d, t parameters. MIO is closed, switch to use P2, I2, d2, r2 parameter.	
CF	Advanced function code	CF parameter is to define advanced function. Algorithm as follows **CF=A*1+B*2+C*4+D*8+E*16+F*32+G*64+H*128+I*256** **A=0** stand for dHAL and dLAL is deviation alarm. **A=1,** stand for dHAL and dLAL is high/low limit alarm. This enable the instrument two high or two low alarm. **B=0,** alarm or ON-OFF control's return difference is unilateral. **B=1,** alarm or ON-OFF control's return difference is bilateral. **C=0,** light beam displays output value. **C=1,** light beam displays measuring value.(Only for instrument with light beam) **D=0,** password to enter parameter sheet is 909. **D=1,** password to enter parameter sheet is equal to PASd parameter value. **E=0,** CHAL is high limit alarm, CLAL is low limit alarm. **E=1,** CHAL is higher deviation alarm, CLAL is lower deviation alarm. **F=0,** accuracy control mode, internal resolution is ten times of display resolution. For linear input, maximum display value is 3200 unit. **F=1,** high resolution display mode, for required display value larger than 3200 unit. **G=0,** allow to alarm when sensor breaks(which makes measuring value very high). High limit alarm value should be set as smaller than signal range limitation. **G=1,** do not allow to alarm when sensor breaks (which makes measuring value very high). This function will delay high limit alarm for 30 seconds even in normal status. **H=1,** within range alarm, between CHAL and CLAL. When H=1, E item is invalid, only B=1 is valid. **I=0,** free protocol communication. **I=1,** Modbus protocol communication, 03/06 command supported.	0~511 Please set this parameter as 0 if you are not a skilled user of this instrument
PASd	Password	If PASd=0~255 or CF.D=0, user can enter parameter sheet by setting LCK=909 If PASd=256~999 and CF.D=1, user can only enter parameter sheet by setting LCK=PASd Recommended to use 909 password for general use.	0~9999
CL	Low limitation of SV	Minimum limitation of SV setting value	-999~ +3200 unit
CH	High limitation of SV	Maximum limitation of SV setting value	
SP1	Set point 1	For CHCD series or CHCD-P model, parameter Pno=0 or 1, SV=SP1	CL~CH
SP2	Set point 2	For CHCD series or CHCD-P model, parameter Pno=0 or 1, and MIO port installed I2 module, Et=1.2 can switch SP1/SP2 by an external switch. Switch disconnected, SV=SP1; switch connected SV=SP2.	
EP1~EP8	Field parameter definition	Please refer to chapter **V. LCK (parameter lock) and field parameter** .	

VII. Special function instruction

1. Single-phase phase-shift output

Set Op1 to PHA1, K5/K6 module is installed on OUTP port can achieve SCR phase-shift output. It can control SCR's deflection angle to change heat's power. Nonlinear amend on power according to sine wave. Trigger's synchronization technic enable instrument to work with different power source from heater. This model can be used with 50Hz power source.

2.Power on alarm free function

Instrument may wrongly alarm when electrified. For example, low limit alarm/lower deviation alarm at the beginning of heating process. Or high limit alarm/ higher deviation alarm at the beginning of refrigeration process. Power on alarm free function allow instrument not to alarm when power on, until new alarm occasion occurs.

3. Given value switch / external process control switch

If I2 module is installed on COM port (Or bAud=1, I2 installed on COM port), this instrument can be connected with an external trigger switch for certain operation. Please refer to Et parameter definition about RUN/STOP function and SP1/SP2 set-point switch function.

4. Communication function

CHCD series instrument can achieve communication function by install S or S4 module (RS485) on COMM port. This function enable upper PC to modify the instrument remotely. User can buy an RS232C/RS485 convertor or USB/RS485 convertor for PC connection. Every communication port can be directly connected by 1~60 instruments. Can up to 80 instruments if an RS485 repeater is added. Pay attention to set different address for different instruments in one series. We can provide communication protocol to user for PC suit development.

5. Temperature transmitter

Besides APID/ PID/ ON-OFF control, CHCD series instrument can outputs PV value or SV value from OUTP port. Linear current function make CHCD series instrument become a transmitter.Accuracy of 4~20mA output is 0.3% F.S.

CtrL=PoP, the instrument outputs PV value; CtrL=SoP, the instrument outputs SV value.

OP1, OPL, OPH, Sn, dIL, dIH and Sc parameter is involved in transmitter setting.

For example, an user want to transmit type K thermocouple into current signal. Temperature range 0~400℃ , output 4~20mA. He can set Sn=0, dIL=0.0, dIH=400.0, OP1=4-20, OPL=0, OPH=100. And then install X module on OUTP port.

So when measuring temperature is equal to or smaller than 0℃ , instrument outputs 4mA; when measuring temperature is equal to or larger than 400℃ , instrument outputs 20mA; Linear output between 0~400℃

6. Setting value limitation

User can limit settable range of setting value by modify CL and CH parameter.

VII. Output module function

Main output

L1/L4: Large capacitance relay (constant-open) contact switch output module (resistance capacitance absorb) (capacitance: DC30V/2A, AC250V/2A, suitable for output control)

G : SSR output module (DC 12V/30mA time proportional output)

W1（W2）: SCR non-contact constant-open output module (capacitance: AC 100~240V/0.2A "not easy to burned")

K1: Single-phase thyristor zero crossing trigger output module

K3: Three-phase thyristor zero crossing trigger output module

K5: Single-phase thyristor phase-shifting trigger output module

X: 4~20mA Programmable linear current output module

AUX output

L2 : Relay normally-open and normally-close contact switch output module (capacitance: DC30V/2A, AC250V/2A, normal type)

L5 : Dual normally-open contact switch output module (capacitance: DC30V/2A, AC250V/2A, suitable for alarm)

V24/V12/V5 : Isolated DC V24/V12/V5 voltage output, with maximum current of 50mA, can supply power for outer sensor/transmitter/other circuit.

S : Isolated photoelectric power supply, RS485 communication module

⚠ **For v8.9 software version, this software version does not support hear/refrigeration two channel function and Multiple programmable segment ramp and soak function. If you need these functions, please feel free to contact us for other software version. Thank you.**