COMMUNICATION TYPE TEMP. CONTROL UNIT

TEMPERATURE CONTROL UNIT

ISO 9001 KEMA CERT. No. 60033 DUTCH COUNCIL FOR ACCREDITATION

c UL us

NCL-13A

Remote Operation from Your PC!

Control and Communication Functions in a Slimline Unit!

Shinko

Features

(Actual size)

Small and space saving

Width: 17.5mm, Height: 75mm, Depth: 85mm (excluding the plug)
Its compactness ensures easy mounting when only limited space permits.

Standard 4 alarm points

Four points of alarm are standard feature.
However, for Alarm 2, Alarm 3 and Alarm 4, the output and Energized/Deenergized functions are not available.

Multi-input

18 type of inputs such as thermocouple (10 types), RTD (2 types), DC current (2 types), DC voltage (4 types) are available.
Fast 0.25-second input sampling period allows applications for various processes.

Easy mounting, removal and maintenance

Hook the NCL-13A into the DIN rail, then fit the unit to the DIN rail.
Since the unit is fixed tightly to the DIN rail, it is resistant to vibration, whereby ensuring ease of maintenance.

Multi-drop communication

Various operations and settings can be carried out from PCs and programmable interfaces through communication function (Up to 31 units of the NCL-33A can be connected.)
For the communication protocol, Shinko protocol and Modbus protocol are available. (For Modbus protocol, RTU mode and ASCII mode can be selected by the DIP switch.)
Connection to the open network Modbus is possible.

Easy connectivity

Using a screw type plug, the power and communication lines can be connected. Bus plugs enable multiple connection of the NCL-13A units.
The spring type plug for input and output can also be connected or removed.

Specifications

■Model name

NCL-13A-□/M □□□□				
Control output	R			Relay contact
	S			Non-contact voltage (for SSR drive)
	A			DC current
	C			Open collector
Input		M		Multi-input
Option		W (20A)	Single phase	Heater burnout alarm/Actuator short circuit alarm
		W (100A)		
		W3 (20A)	3-phase	
		W3 (100A)		
		DC		Heating/Cooling control output

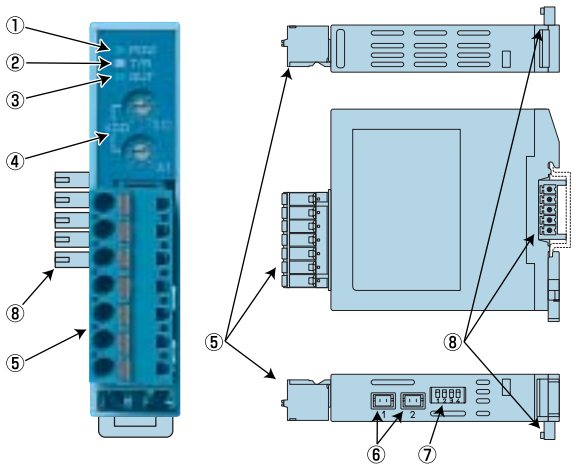
Specify your specification from the above □, □□ columns.
When adding options, enter them by punctuating with a comma.

■Rated range (Full multi-range)

Input type		Input range	
Thermo-couple	K	−200 to 1370 ℃	−320 to 2500 ℉
		−199.9 to 500.0℃	−199.9 to 932.0℉
	J	−200 to 1000 ℃	−320 to 1800 ℉
	R	0 to 1760 ℃	0 to 3200 ℉
	S	0 to 1760 ℃	0 to 3200 ℉
	B	0 to 1820 ℃	0 to 3300 ℉
	E	−200 to 800 ℃	−320 to 1500 ℉
	T	−199.9 to 400.0℃	−199.9 to 750.0℉
	N	−200 to 1300 ℃	−320 to 2300 ℉
	PL-Ⅱ	0 to 1390 ℃	0 to 2500 ℉
	C(W/Re5-26)	0 to 2315 ℃	0 to 4200 ℉
RTD	Pt100	−200 to 850 ℃	−300 to 1500 ℉
		−199.9 to 850.0℃	−199.9 to 999.9℉
	JPt100	−200 to 500 ℃	−300 to 900 ℉
		−199.9 to 500.0℃	−199.9 to 900.0℉
DC current	4 to 20mA DC	−1999 to 9999	
	0 to 20mA DC	−1999 to 9999	
DC voltage	0 to 1V DC	−1999 to 9999	
	0 to 10V DC	−1999 to 9999	
	1 to 5V DC	−1999 to 9999	
	0 to 5V DC	−1999 to 9999	

・For DC current input, connect 50Ω shunt resistor (RES-S03-050, sold separately) between input terminals.

■Name and functions of the sections



①Power indicator (POW)
A green LED lights up when the instrument is switched on.
A green LED flashes when an alarm (temperature alarm, Heater burnout alarm/Actuator short circuit alarm, Loop break alarm) is activated.

②Communication indicator (T/R)
A yellow LED lights up during Serial communication TX output.

③Control output indicator (OUT)
When Control output is ON, green LED lights up. For DC current output, a green LED flashes corresponding to the output manipulated variable.

④Rotary switch for instrument setting
Sets the instrument number of the NCL-13A.

⑤Spring type plug(Removable)
Plug for the input, control output and Event output.

⑥CT1, CT2 input connectors
Connectors for CT input of Heater burnout alarm/Actuator short circuit alarm (Option: W, W3)

⑦DIP switch for Communication speed and Communication protocol
Dip switch for selecting Communication speed and Communication protocol

⑧Bus plug (Removable)
Plug for lines (Power bus, Communication bus)
When connecting multiple units, the bus plug can connect to another bus plug.

■Standard specifications

Action indicators	POW (Power indicator) ---------- A green LED lights up when the power to the NCL-13A is turned on. Flashes if an alarm occurs (Temperature alarm, Heater burnout alarm/Actuator short circuit alarm, Loop break alarm). T/R (Communication indicator) -- A yellow LED lights up during serial communication TX output. OUT (Control output indicator) --- A green LED lights up when the control output is ON. For DC current output, this flashes corresponding to the output MV.
Input	Thermocouple ---- K, J, R, S, B, E, T, N, PL-Ⅱ, C (W/Re5-26) External resistance: 100Ω or less (However, for B input, 40Ω or less) RTD ---------- Pt100, JPt100 3-wire system (Allowable input lead wire resistance: 10Ω or less per wire) DC current -------- 0 to 20mA DC, 4 to 20mA DC: Input impedance: 50Ω (Connect 50Ω shunt resistor between input terminals.) Allowable input current: 50mA DC or less (When 50Ω shunt resistor is used) DC voltage -------- 0 to 1V DC Input impedance: 1MΩ or greater Allowable input voltage: 5V or less, Allowable signal source resistance: 2kΩ or less 0 to 5V DC, 1 to 5V DC, 0 to 10V DC Input impedance: 100kΩ or greater Allowable input voltage: 15V DC or less, Allowable signal source resistance: 100Ω or less
Accuracy (Setting・indication)	Thermocouple ---- Within ±0.2% of each input span ±1 digit, or within ±2℃(4℉), whichever is greater However, R, S inputs, 0 to 200℃(0 to 400℉): Within ±6℃(12℉) B input, 0 to 300℃(0 to 600℉): Accuracy is not guaranteed. K, J, E, T, N inputs, 0℃(32℉) or less: Within ±0.4% of each input span ±1 digit RTD ---------- Within ±0.1% of each input span ±1 digit or within ±1℃(2℉), whichever is greater DC current -------- Within ±0.2% of each input span ±1 digit DC voltage -------- Within ±0.2% of each input span ±1 digit
Input sampling period	0.25 seconds
Control output (OUT)	Relay contact ---------- 1a, Control capacity: 3A 250V AC (resistive load), 1A 250V AC (inductive load cos ϕ =0.4), Electric life: 100,000 times Non-contact voltage --- 12^{+3}_{-0}V DC, Max. 40mA DC (short circuit protected) DC current ---------- 4 to 20mA DC, Load resistance: Max. 550Ω (Output accuracy: Within ±0.3% of output span, Resolution: 12000) Open collector ---------- 24V DC, Max. 100mA DC (isolation type)
Control action	PID (with auto-tuning), PI, PD (with manual reset), ON/OFF OUT1 proportional band (P) -- 0.0 to 110.0% (Default: 2.5%) Integral time (I) ---------- 0 to 1000s (Off when set to 0) (Default: 200s) Derivative time (D) ---------- 0 to 300s (Off when set to 0) (Default: 50s) OUT1 proportional cycle ------ 1 to 120s (Default: -R/M 30s, -S/M 3s, -C/M 3s, -A/M Unavailable) ARW ---------- 0 to 100% (Default: 50%) OUT1 ON/OFF hysteresis ---- 0.1 to 100.0℃(℉) (Default: 1.0℃) DC current, DC voltage: 1 to 1000 OUT1 output limit ---------- 0 to 100% (DC current output: −5 to 105%, Ineffective when ON/OFF action) (Default: OUT1 low limit 0%, high limit 100%)
Alarm	Alarm 1 output: When Alarm 1 action Energized is selected during Alarm 1 Energized/Deenergized selection mode, the alarm action point is set by ±Deviation from the SV (Except Process alarm). When the input goes out of the range, the Event output is turned ON or OFF (for High/Low limit range alarm). When the action Deenergized is selected, the output acts conversely. This alarm shares output terminals with Loop break alarm and Heater burnout alarm/Actuator short circuit alarm (option W, W3). When option DC is applied, the Event output becomes cooling output. Therefore Alarm 1, Loop break alarm and Heater burnout alarm/Actuator short circuit alarm cannot be outputted. ・No alarm action ・High limit alarm (Deviation setting) Setting range: −(Scaling span) to Scaling span ・Low limit alarm (Deviation setting) Setting range: −(Scaling span) to Scaling span ・High/Low limits alarm (Deviation setting) Setting range: 0 to Scaling span ・High/Low limit range alarm (Deviation setting) Setting range: 0 to Scaling span ・Process high alarm Setting range: Scaling low limit to Scaling high limit value ・Process low alarm Setting range: Scaling low limit to Scaling high limit value ・High limit alarm with standby (Deviation setting) Setting range: −(Scaling span) to Scaling span ・Low limit alarm with standby (Deviation setting) Setting range: −(Scaling span) to Scaling span ・High/Low limits alarm with standby (Deviation setting) Setting range: 0 to Scaling span Off when set to 0 or 0.0 (except the Process high and Process low alarms). When the input has a decimal point, the negative lower limit value is −199.9 or −1999, and the positive upper limit value is 999.9 or 9999. (Default: 0) Setting accuracy ---------- The same as the Accuracy above Action ---------- ON/OFF action Hysteresis setting range --- Thermocouple, RTD: 0.1 to 100.0℃(℉) (Default: 1℃) DC current, DC voltage: 1 to 1000 Output ---------- Open collector, Control capacity: 100mA 24V DC Alarm hold function --------- Once the alarm is activated, the alarm output is maintained until the power supply to the instrument is turned off, or until the alarm flag is reset by the Alarm hold reset command. (Default: Alarm Hold Not used) Alarm hold reset ---------- Can reset the alarm flag by the Communication command (0051H). (0001H: Reset including the standby 0002H: Reset of the alarm flag only.) Alarm 2, Alarm 3 and Alarm 4: Action and type are the same as the above. However, the output and Energized/Deenergized action are not available. The status can be read by reading the status flag in serial Communication.
Loop break alarm [LA]	Detects the actuator abnormality (Heater burnout, sensor burnout). This alarm shares output terminals with Alarm 1 output, Heater burnout alarm/Actuator short circuit alarm (option W, W3). If the option DC is selected, the Event output becomes the cooling output. Therefore Alarm 1, Loop break alarm and Heater burnout alarm/Actuator short circuit alarm are not outputted. Loop break alarm time setting ---- 0 to 200 minutes (Default: 0 minutes) Loop break alarm span setting --- Thermocouple, RTD: 0 to 150℃(℉) or 0.0 to 150.0℃(℉) (Default: 0℃) DC current, DC voltage: 0 to 1500 Output ---------- Open collector, Control capacity: 100mA 24V DC

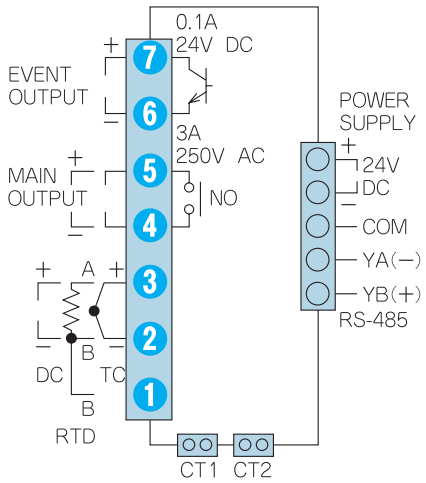
<table>
<tr><td>Serial communication</td><td>
Change of the functions, setting and reading of the values of the NCL-13A can be performed from the host computer.
(The setting data is backed up in the non-volatile IC memory.)
Communication interface -- Based on EIA RS-485
Communication method ---- Half-duplex communication start-stop synchronous
Communication speed ------ 4800, 9600, 19200bps (Selectable by the DIP switch)
<table>
<tr><th colspan="2">DIP switch number</th><th rowspan="2">Communication speed (bps)</th></tr>
<tr><th>1</th><th>2</th></tr>
<tr><td>OFF</td><td>OFF</td><td>9600</td></tr>
<tr><td>ON</td><td>OFF</td><td>4800</td></tr>
<tr><td>OFF</td><td>ON</td><td>19200</td></tr>
</table>
Instrument number ---------- Address 0 to 95 (Selectable with 2 Rotary switches.)
Communication protocol---- Shinko protocol, Modbus ASCII or Modbus RTU mode (Selectable with the DIP switch)
<table>
<tr><th colspan="2">DIP switch number</th><th rowspan="2">Communication protocol</th><th rowspan="2">Start bit</th><th rowspan="2">Data length</th><th rowspan="2">Stop bit</th><th rowspan="2">Parity</th></tr>
<tr><th>3</th><th>4</th></tr>
<tr><td>OFF</td><td>OFF</td><td>Shinko protocol</td><td>1 bit</td><td>7 bits</td><td>1 bit</td><td>Yes (Even)</td></tr>
<tr><td>ON</td><td>OFF</td><td>Modbus ASCII</td><td>1 bit</td><td>7 bits</td><td>1 bit</td><td>Yes (Even)</td></tr>
<tr><td>OFF</td><td>ON</td><td>Modbus RTU</td><td>1 bit</td><td>8 bits</td><td>1 bit</td><td>No</td></tr>
</table>
＊The contents set by DIP switch and Rotary switch become effective when the power to the unit is turned on. Therefore, values changed after the power was turned on are not effective.
</td></tr>
<tr><td>Supply voltage</td><td>24V DC
Allowable voltage fluctuation range: 20 to 28V DC</td></tr>
<tr><td>Power consumption</td><td>Approx. 2 W</td></tr>
<tr><td>Isolation resistance</td><td>10MΩ or greater at 500V DC</td></tr>
<tr><td>Dielectric strength</td><td>Non-contact voltage (-S/M), DC current (-A/M), Open collector (-C/M) output:
Between input terminal and power terminal ------ 0.5kV AC for 1 minute
Between output terminal and power terminal ---- 0.5kV AC for 1 minute
Relay contact (-R/M) output:
Between input terminal and power terminal ------ 0.5kV AC for 1 minute
Between output terminal and power terminal ---- 1.5kV AC for 1 minute</td></tr>
<tr><td>Environment</td><td>Ambient temperature: 0 to 50℃ Ambient humidity: 35 to 85%RH (Non-condensing)</td></tr>
<tr><td>Material・Color</td><td>Case and base: Flame resistant resin, Light gray Bus plug and spring type plug: Polyamide, Light gray</td></tr>
<tr><td>Mounting method</td><td>DIN rail mounting</td></tr>
<tr><td>Setting system</td><td>Receives setting values from the host computer.</td></tr>
<tr><td>External dimensions</td><td>W17.5×H75×D85mm</td></tr>
<tr><td>Weight</td><td>Approx. 85g</td></tr>
<tr><td>Attached functions</td><td>Self-diagnosis (All outputs OFF when abnormal), Automatic cold junction temperature compensation (for thermocouple only), Burnout, Output status selection when input abnormal, Sensor correction, PV filter, Power failure countermeasure, Non-volatile memory saving selection</td></tr>
<tr><td>Required plug sold separately</td><td>Screw type plug for lines (Only one plug is required regardless of the number of NCL-13A units connected.)</td></tr>
</table>

■Options

[Specify the option code according to users' needs.]

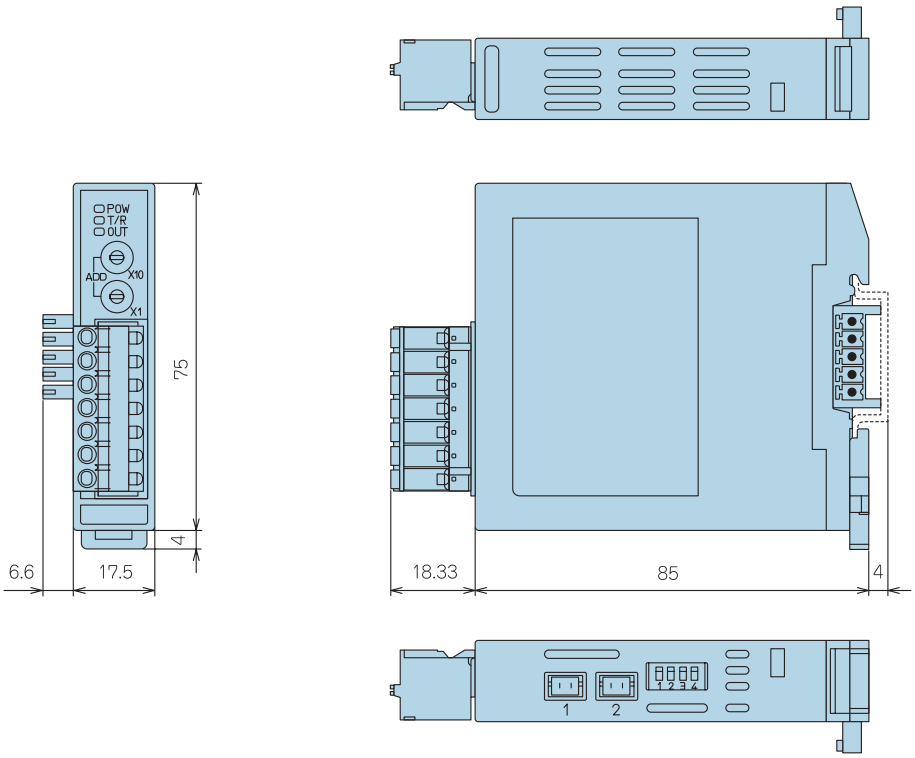
<table>
<tr><td>Heater burnout alarm/
Actuator short circuit alarm
Single phase [W],
Three-phase [W3]</td><td>
This option cannot be applied to DC current output type.
By adding this option, the heater current is watched by the current transformer (CT), then the heater burnout can be detected.
Specify one heater rated current either 20A or 100A.
Setting accuracy ----- Within ±5% of the rated value
Action ---------- ON/OFF action
Output ---------- Open collector, Control capacity: 100mA 24V DC
Output self-holding -- Not available
Accessories ---------- Option W (20A) : Wire harness 3m 1 length, CT(CTL-6S) 1 piece
Option W (100A) : Wire harness 3m 1 length, CT(CTL-12-S36-10L1U) 1 piece
Option W3 (20A) : Wire harness 3m 2 lengths, CT(CTL-6S) 2 pieces
Option W3 (100A) : Wire harness 3m 2 lengths, CT(CTL-12-S36-10L1U) 2 pieces
</td></tr>
<tr><td>Heating/Cooling control output [DC]</td><td>
By applying this option, Control output 2 can be added, and Heating/Cooling control can be performed.
If the option DC is selected, the Event output works as a cooling action. Therefore Alarm 1, Loop break alarm, Heater burnout alarm/ Actuator short circuit alarm will not be outputted.
For the control output type, only an open collector output (DC) is available.
Heating control action: The same as the control output (OUT).
Cooling control action:
OUT2 proportional band ---------- 0.0 to 10.0 times Control output (OUT1) proportional band (ON/OFF action when set to 0.0)
Integral time (I) ---------- The same as that of Control output (OUT1) integral time
Derivative time (D) ---------- The same as that of Control output (OUT1) derivative time
OUT2 proportional cycle ---------- 1 to 120 seconds (Default: 3s)
Overlap band/Dead band ---------- Thermocouple, RTD: −100.0 to 100.0℃(℉)
DC current, DC voltage: −1000 to 1000
OUT2 ON/OFF hysteresis --------- Thermocouple, RTD: 0.1 to 100.0℃(℉)
DC current, DC voltage: 1 to 1000
OUT2 high limit, OUT2 low limit -- 0 to 100% (Not available for ON/OFF action)
(Default: OUT2 low limit; 0%, OUT2 high limit; 100%)
OUT2 action mode selection
・Air cooling : Linear characteristic (Default)
・Oil cooling : 1.5th power of the linear characteristic
・Water cooling : 2nd power of the linear characteristic
</td></tr>
</table>

■Terminal arrangement



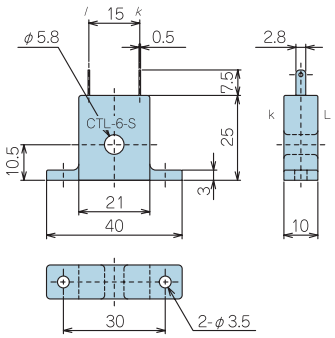
POWER SUPPLY	Power supply terminals
EVENT OUTPUT	Event output terminals [Alarm 1 (shares output terminals with Heater burnout alarm/Actuator short circuit alarm and Loop break alarm) or Cooling control output.]
MAIN OUTPUT	Main control output terminals
RS-485	Serial communication terminals
CT1, CT2	CT (current transformer) input terminals These terminals are attached only when the option Heater burnout alarm is applied.
TC	Thermocouple input terminals
RTD	RTD input terminals
DC	DC current, voltage input terminals

■External dimensions

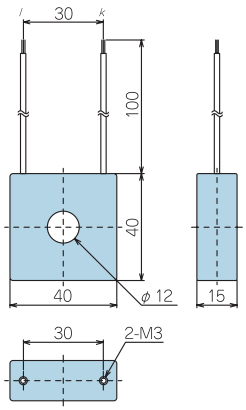


■CT dimensions

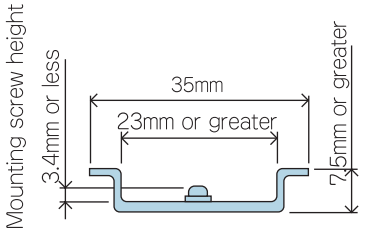
CTL-6-S (for 20A)



CTL-12-S36-10L1U (for 100A)



■DIN rail mounting (Applicable DIN rail specifications)

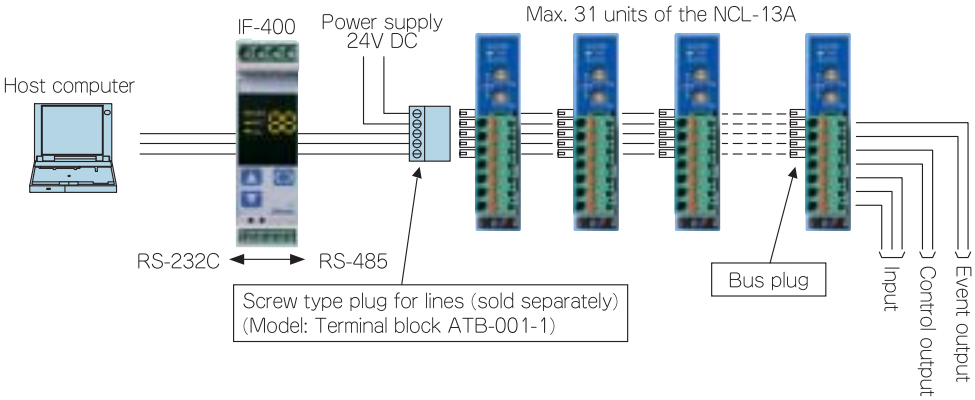


Width : 35mm
Height : 7.5mm or greater
Groove width : 23mm or greater
DIN rail mounting screw height:
3.4mm or less (At a DIN rail height of 7.5mm)

Configuration example

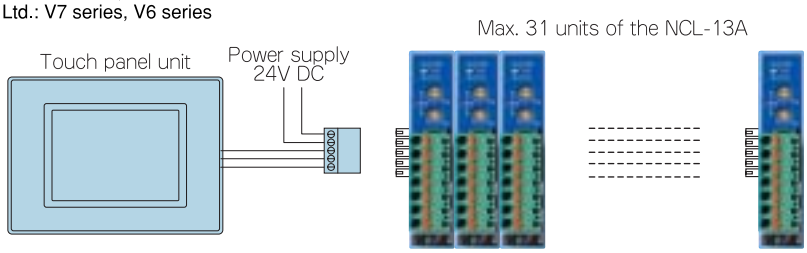
When connecting to a PC (Basic configuration)

If a personal computer is connected to the NCL-13A units via a Communication converter(IF-400), up to 31 temperature control points can be monitored.
(The communication converter is not necessary if RS-485 communication lines for the personal computer are used.)



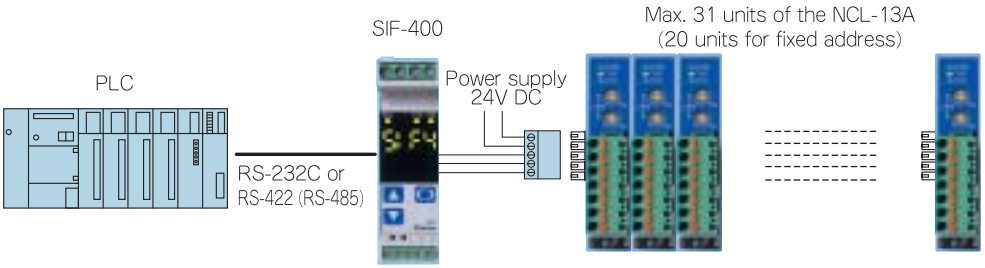
When connecting to a touch panel unit

By connecting to a touch panel unit (programmable interface), up to 31 points of temperature control and monitoring can be performed.
The NCL-13A complies with the following touch panel units.
Digital Electronics Corp.: GLC series, GP series
Hakko Electronics Co. Ltd.: V7 series, V6 series



When connecting to the PLC

A maximum of 31 units of the NCL-13A can be connected with the PLC via PLC interface unit SIF-400.
Please contact us to determine which PLCs correspond to the SIF-400.



SAFETY PRECAUTIONS

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after consulting purpose of use with our agency or main office.
  (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protection equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Caution with respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.
In the case of resale, ensure that this instrument is not illegally exported.

· This catalog is as of September 2006, and specifications are subject to change without notice.
· If you have any inquiries, please consult our agency or with us directly.

ISO 9001 KEMA CERT. No.60033

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