

# General Specifications

## Circuitrend V5

### OVERVIEW

The Circuitrend recorder, the world's first paperless circular chart recorder, has been updated to include all math, event, totaliser and pen group facilities as standard. Data is displayed on a 10.4" colour LCD (TFT) screen and can be viewed in both circular format as well as strip chart format. Data is stored on a 3.5" disk.

The Circuitrend V5 software is **TrendManager Pro**, this is the world's most comprehensive recorder software support package. Running under Windows it offers recorder Configuration and Simulation, Data Archiving, Graphing, Printing, Communications and Export.



### FEATURES

- Paperless recording - no paper, pens, mess or maintenance.
- Bar code interface for chart annotation - batch identification
- 12 month pay back on pen recorder replacements
- 10.4" colour TFT with super wide viewing angles
- View data as circular, strip chart or tiled display
- Ability to group inputs on multiple charts
- Rapid, simple on plant configuration
- Network up to 256 recorders to a PC
- Secure, encrypted data storage
- Continuous chart always visible
- 2, 4, 6 and 8 input channels
- Flow totalisation - standard
- 250 mSec response time
- DIN standard bezels
- Total data integrity
- Nema 4 enclosure, designed to IP65

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## Standard Specifications

### CONSTRUCTION

#### Mounting:

Flush panel mounting on a vertical plane.

#### Panel thickness:

2 to 100 mm

#### Material:

- Case: aluminium extrusion
- Bezel: injection moulded ABS

#### Dimensions:

W: 350 mm, H: 144 mm, D: 140 mm

#### Weight:

5 kg max. panel mounted

10.5 kg max. IP65/Nema4

#### Controller slots:

1/16 DIN slots - 2

### INPUTS

#### Number:

2, 4, 6 or 8 input channels.

#### Sample rates:

Standard Analogue Card	125 mS for all channels
Universal Analogue Card	1 Sec for 2/4 channels
	1.5 Sec for 6/8 channels

#### Inputs types:

Standard Analogue Card	
dc Voltage	0-5 V and 1-5 V ( $>10\text{ M}\Omega$ )
dc Current	0-20 mA, 4-20 mA (into $10\text{ }\Omega$ )

Universal Analogue Card	
dc Voltage	$\pm 0-1\text{ V}$ , $\pm 0-10\text{ V}$ , $\pm 0-100\text{ mV}$ , $\pm 0-200\text{ mV}$ (All $>10\text{ M}\Omega$ )
dc Voltage	$\pm 0-10\text{ mA}$ (into $10\text{ }\Omega$ ), $\pm 0-20\text{ mA}$ (into $10\text{ }\Omega$ )

#### Resolution:

Standard analogue:  $<0.01\%$  (12 Bit ADC)

Universal analogue:  $0.0015\%$  (16 Bit ADC)

#### Accuracy:

Standard analogue:  $\pm 0.5\%$  of full range.

Universal analogue: Voltage ranges  $\pm 0.02\%$  of full range.

Current ranges  $\pm 0.04\%$  of full range.

#### Ambient temperature effect:

-V, mV  $0.005\%/^{\circ}\text{C}$

-mA  $0.02\%/^{\circ}\text{C}$

#### Voltage input resistance

Standard analogue:  $>1\text{ M}\Omega$

Universal analogue:  $>1\text{ M}\Omega$

#### Current loop resistance:

Standard analogue: Internal, approx.  $10\text{ }\Omega$ ,  $\pm 5\%$

Universal analogue: Internal, approx.  $10\text{ }\Omega$ ,  $\pm 5\%$

#### Transmitter power supply

Optional on standard analogue: 18-24 V, 25 mA

#### Isolation:

Standard and Universal analogue: 100 Vdc channel to channel, channel to ground.

#### Reference conditions:

Temperature –  $20^{\circ}\text{C}$

Humidity –  $65\% \text{ RH } \pm 15\%$

#### Resistance Thermometer: PT100 to BS1904

Burn Out	upscale
Range	$-200\text{ to }+400^{\circ}\text{C}$
Min span	$20^{\circ}\text{C}$
Accuracy	$\pm 0.2$ of span

**INPUTS (CONT.)****Long term stability:**

0.1 %/year

**Ambient temperature effect:**

RTD - 0.035 %/°C

**Source resistance:**

RTD - 0.1 °C/Ω (40 Ω max.) approx.

**Thermocouples:**

Type	Temperature range	Accuracy as % of span
K	-100 °C to 1000 °C	± 0.1 %
	1000 °C to 1200 °C	± 1 %
R	0 °C to 400 °C	± 4 °C (1.0%)
	400 °C to 1400 °C	± 0.1 %
	1400 °C to 1700 °C	± 2.5 %
S	0 °C to 400 °C	± 4 °C (1.0%)
	400 °C to 1400 °C	± 0.1 %
	1400 °C to 1700 °C	± 2.5 %
B	0 °C to 600 °C	no spec
	600 °C to 1050 °C	± 2.5 %
	1050 °C to 1650 °C	± 3.5 %
	1650 °C to 1750 °C	± 4.5 %
J	0 °C to 1100 °C	± 0.1 %
T	-100 °C to 300 °C	± 0.75 °C
	300 °C to 400 °C	± 0.1 %
E	0 °C to 800 °C	± 0.1 %
N	0 °C to 1300 °C	± 0.1 %
C	0 °C to 2300 °C	± 0.2 %

Note: Sensor errors are not included

**Temperature effect:**

T/C - 0.01 %/°C

**Source resistance:**

T/CmV 0.5 °C/100 Ω (1000 Ω max.) approx.

**Reference junction accuracy:**

± 1 % °C

**Cold junction effect:**

0.03 °C/°C

**Integration time:**

50/60 Hz for mains rejection

**Linear Scaling:**

-9999 to +9999, scale factor of 1 to 9999.

Decimal point automatic.

Engineering units, user definable (5 characters)

**Square root extraction:**

Scaling limits: ± 1,000,000

Decimal point: User selectable

Engineering units: user definable, up to 12 characters

**DATA STORAGE**

Data (internal): 128 KB

Data (transfer): 1.44 Mbyte

Setup (internal): EEPROM

**DISPLAY****Display used:**

- Size: 10.4" colour high brightness wide viewing angle
- Resolution: VGA (640 x 480 pixels)
- Technology: Industrial LCD (TFT)

**Analogue Display methods:**

- Horizontal: Thick or thin traces, with or without bar, max/min markers, major & minor divisions, time and date marked, name and description. Large duty labels, large live totals, large trend name key (20 characters) zero based bar.
- Vertical: Thick or thin traces, with or without bar, max/min markers, major & minor divisions, time and date marked, name and description, wide chart, thin bar, scale on bar, no scale, time stamp frequency. Large duty labels, large live totals, large trend name keys (20 Character), zero based.
- Tiled: One pen per 'Tile', thick or thin trace, with or without bar, max/min markers, major & minor divisions, time & date marked, digital panel only.
- Circular: With or without panel meters, with or without event display. Major & minor divisions. With or without live totals.

**Analogue display, colours:**

Pen No.	Colour	Pen No.	Colour
Pen 1	Red	Pen 5	Cyan
Pen 2	Magenta	Pen 6	Dk Red
Pen 3	Green	Pen 7	Dk Purple
Pen 4	Blue	Pen 8	Dk Green

**Digital Indication:**

Digital values update every second, alarms on bars, engineering units, pen name, events including tag, time & date, 20 character description & totalised values.

**Memory Status:**

Disk % full is be displayed at all times.

**Recorder Identification:**

Recorder name, Description, Time and Date displayed at all times.

**Chart speed:**

Chart sec/div		Chart min/div		Chart hr/div	
5	250 mS/log	1	3 s/log	1	3 min/log
10	500 mS/log	2	6 s/log	2	6 min/log
15	750 mS/log	3	9 s/log	3	9 min/log
20	1 s/log	4	12 s/log	4	12 min/log
30	1.5 s/log	5	15 s/log	6	18 min/log
40	2 s/log	6	18 s/log	8	24 min/log
50	2.5 s/log	8	24 s/log	9	27 min/log
60	3 s/log	10	30 s/log	10	30 min/log
100	5 s/log	15	45 s/log	12	36 min/log
200	10 s/log	20	60 s/log	16	48 min/log
		30	90 s/log	20	60 min/log
		40	2 min/log	24	72 min/log
		60	3 min/log	36	108 min/log
		100	5 min/log	48	144 min/log

**Other Display Contents:**

Rotating bars, black chart, fully programmable display values in engineering units. Time & date stamp on every division, current time & date, session number writing, writing, read only, recycling. Scrolling description & ID number.

**Display magnification/reduction functions:**

Use QuickView for instant alternate time scale, chosen from:

- 20, 50, 100 Sec/Div
- 5, 10, 20 Min/Div
- 1, 2, 4, 8, 12, 20, 24, 48 hour/Div

**Temperature units:**

°C, °F, or K (Kelvin)

**Language:**

Honeywell's recorder firmware is available in these language variants including:

- English UK
- German

**LOGGING**

Pen specific logging set up

**Logging method:**

Sample, Average, MaxMin

**Logging Rates:**

Data is logged to disk at 20 samples per division

- 5 to 90 sec per division
- 1 to 90 min per division
- 1 to 48 hours per division

**POWER SUPPLY****Rated power supply:**

Voltage 90 to 264 Vac

**Rated power supply frequency:**

47 to 440 Hz.

**Power consumption:**

Consumption <50 VA

**POWER dc. (OPTIONAL)**

Voltage: 12 or 24Vdc (optional)

Consumption: <30 W

**DATA SAVING FUNCTION****Storage medium:**

3.5" Floppy disk (DD or HD) 1.44 Mbyte

**Method:**

Buffered data transfer to disk

**Data Saving Period:**

Related to log rate, number of pens, totals, events and alarms.

**File Format:**

All files are binary encrypted for complete data security, and minimum size. The format offers the most compact storage method of any paperless chart recorder on the market.

**Saved File Types:**

- Setup.\*\*\*

A setup file accompanies every recording session, with complete recorder configuration information. Setup.002 is the 3rd setup file on the disk.

- Log01.\*\*\*

Each pen is individually configurable for Log rate and log type, with its own data file, e.g.

Log01.003, is Pen 1-fourth data file.

**Sample**, stores instantaneous data sampled at a specific rate.

**MaxMin**, stores the maximum and minimum values between two specific log points and saves both.

**Average**, stores the average value between two specific log points.

**Max**, stores the maximum value sampled between two specific log points.

**Min**, stores the minimum value sampled between two specific log points.

- Event.\*\*\*

The Event.001 holds all event information for recording session 001. This includes derived events, markers, system events and periodic events. Each event having a time and date stamp, a 5 character 'Tag' and 20 character 'Description'.

- Total.\*\*\*

The Total.002 holds all stored totalisation values for all pens during recording session 002. Totals are logged at a programmable interval.

Every:

- 1 minute
- 5 minutes
- 15 minutes
- 30 minutes
- 1 hour
- 6 hours
- 24 hours

**SAMPLING TIMES**

Analogue input sample speed is set per card not per unit

Standard card	Universal card
4 times per second	2/4 ch. = 1 per second 6/8 ch. = 1.5 per second

For the Circitrend V5 the disk will last as follows:

2 Pens	(more than 300,000 point/channel)			
Min/Div	1 Min	5 Min	10 Min	20 Min
Disk Lasts	10 days	54 days	110 days	220 days

Sample	250mSecs	0.5 Sec	1Sec	2 Sec
Disk Lasts	28 Hrs	2 days	4 days	8 days

4 Pens	(more than 150,000 point/channel)			
Min/Div	1 Min	5 Min	10 Min	20 Min
Disk Lasts	5 days	27 days	55 days	110 days

Sample	250mSecs	0.5 Sec	1Sec	2 Sec
Disk Lasts	14 Hrs	1 days	2 days	4 days

6 Pens	(more than 100,000 point/channel)			
Min/Div	1 Min	5 Min	10 Min	20 Min
Disk Lasts	80 Hrs	18 days	36 days	72 days

Sample	250mSecs	0.5 Sec	1Sec	2 Sec
Disk Lasts	8 Hrs	16 Hrs	1.5 Hrs	3 Hrs

8 Pens	(more than 75,000 point/channel)			
Min/Div	1 Min	5 Min	10 Min	20 Min
Disk Lasts	40 Hrs	13 days	26 days	50 days

Sample	250mSecs	0.5 Sec	1Sec	2 Sec
Disk Lasts	5.5 Hrs	11 Hrs	1 day	2 days

NB. All times are calculated for sample or average logging. For max/min logging simply divide Disk Lasts value by 2.

**Trigger Function:**

An external contact, key on the recorder, timer, event or alarm can be used to start or stop recording.

**Disk Full:**

In recycling: Oldest data over written.

In standard: Recording stops.

At 90 % full: Alarm contact may be set.

**Other Specifications****Clock: Real time**

- With calendar function
- The time can be adjusted and synchronised using Trendbus comms link option
- Summer/Winter time adjustable
- Accuracy:  $\pm 100$  ppm to resolution of 1 second.

**Memory backup:**

- Clock: Lithium battery, 10 years life (powered).
- Setup: EEPROM & Disk.
- Data: Disk.

**Password protection:**

Restricts user entry to operation modes at different levels preventing setting changes.

**Insulation resistance:**

Each terminal to ground terminal 9.9 M $\Omega$  or greater.

**Dielectric strength test:**

- Power supply to ground terminal: 1350 Vac (50/60 Hz), 1 minute.

## ***NORMAL OPERATION CONDITIONS***

**Power voltage:** 90 TO 264 VAC AUTO SELECT

**Power supply frequency:** 47 to 440 Hz

**Ambient temperature:** 0 °C to 50 °C

**Ambient humidity:** 10 % to 90 % RH (non-condensing)

**Vibration:** 5 to 100 Hz, 10 m/s

**Shock:** 1 g

**Magnetic field:** 450 AT/m (0 to 60 Hz)

### **Noise:**

Normal mode (50/60 Hz):

- Standard card < 10 %
- Universal card < 10 %

Common Mode (50/60 Hz)

- 200 V max

**Mounting:**  $\pm 15^\circ$  from the horizontal

**Warm up:** 20 minutes minimum.

## ***SAFETY AND EMC STANDARDS***

### **Safety standards:**

Complies with EN61010-1:1993

### **Immunity:**

Complies with EN50082-2

### **Emissions:**

Complies with EN50081 - 1

### **Disturbances:**

Complies with EN60555-2, EN60555-3

## ***ENCLOSURE***

### **Environmental protection:**

Circuitrend V5 recorders can be mounted in an IP65/ NEMA 4 enclosure

## ***TRANSPORT AND STORAGE CONDITIONS***

These conditions refer to the time during shipment from the factory and the start of operation. This includes storage time and transportation and storage time if briefly out of operation.

**Ambient temperature:** -25 to 60 °C

**Relative humidity:** 10 % to 90 % RH

**Operating temperature:** 0 to 50 °C

**Storage temperature:** -10 to 60 °C

## ***Options Specifications***

### ***PEN INPUTS (UNIVERSAL CARD)***

#### **Sample rate:**

- 250mS for standard analog cards
- 1 sec for 4 channel universal analog card
- 1.5 sec for 8 channel universal analog card

**Number:** 2, 4, 6, 8 channels

#### **Type:**

- $\pm 100$  mV ( $>1$  M $\Omega$ )
- $\pm 200$  mV ( $>1$  M $\Omega$ )
- $\pm 1$  V ( $>1$  M $\Omega$ )
- $\pm 10$  V ( $>1$  M $\Omega$ )
- $\pm 10$  mA (into 10  $\Omega$ )
- $\pm 20$  mA (into 10  $\Omega$ )

**Resolution:** 0.0015 %

#### **Accuracy:**

- Voltage range  $\pm 0.02$  % of full range
- Current ranges  $\pm 0.04$  % of full range
- RTDs & thermocouples

#### **Isolation:**

100 Vdc channel to channel; channel to ground.

**Alarm Cards**

An alarm signal is output from the rear panel, via a 24-way connector, as a relay contact signal.

Programmable alarm set points can be configured to activate up to 8 relay outputs.

Alarm types comprise of high and low rate of change.

**Update rate:**

250 mS for all alarms

**Number:**

- 4 or 8 relay contacts
- 8 relay contacts/ 2 digital inputs
- 8 I/O

**Type:**

High, Low, Rate up & Rate down

**Display:**

The alarm status and type are displayed on the Bar, or by digital value. The alarm changes colour on activation

**Hysteresis:**

On (0-to 100 %) or Off, selectable by channel and alarm. Selectable symmetrical or not.

**Damping:**

Selectable by channel and by alarm, to seconds, minutes and hours

**Peaks:**

Selectable by channel and by alarm, to seconds, minutes and hours.

**Label:**

5 character alarm label

**Logged:**

Log alarm to disk as an event, selectable by channel and by alarm. Number only limited by space on the disk.

**Outputs:**

Any alarm on any pen, may be programmed to activate any one or multiple combination of relay outputs. 4 or 8 output cards available.

**Activation:**

Fully programmable from over 12 internal alarm levels or rates of change.

**Relay contact rating:**

- 4 or 8 relays 2 input/output - 3A 240 Vac (non inductive, internally suppressed)
- 8 input/output - C/NC – 1 A 24 Vdc (non-inductive)

All input contacts only

**Terminal configuration:**

- 4 or 8 relays 2 input/output - SPDT (NO-C-NC).
- 8 input/output - SPDT (C/NO)

**DIGITAL I/O**

8 channel digital input/output card where all channels may be used as digital inputs. A digital input is provided by a volt free contact between the normally open (NO) and a common (C) terminal of an output relay. If not used as alarm outputs.

**COMMUNICATIONS MEDIA AND PROTOCOL****Connections:**

RS485

**Protocol:**

- Honeywell private protocol (Trendbus)
- Modbus

**Media:**

- RS485 (2 or 4 wire bus, isolated)
- Barcode interface (TTL)

**Modbus:**

Mode: RTU SLAVE

Data type: Data read, data write  
values in % (0 – 100%)

Wiring: 2 wires (for RS485)



**FIRMWARE****Maths expression:**

All analogue input channels have a maths expression block.

This is a fully user programmable 60 character maths calculation for each pen. Maths calculations available on all pens, plus up to 8 extra pens.

Add, Subtract, Multiply, Divide, Squared to the Power of n, Square Root, Modbus, Log, LN, Lowest, Highest, Round, Reciprocal, Derived Pen, Absolute, To any Root, Totalised, To the Power of, Over, Under, Inside, Outside, SIN, COS, TAN, F2C, C2F, Rolling Average and Delay.

**Totalisation:**

Totalises the value of a pen, a total measured over a timed period.

User programmable fully independent 10 digit totalisation channels can be configured with each pen.

**Events marker:**

10 user defined process events are recorded and actioned. These can consist of recording start/stop, digital inputs, user key press, totalising actions, timers, barcode, etc.

Once an event has been caused it can produce a definable set of effects on the recorder which can include, mark on chart, relay outputs, recording control, counters, totalising actions, triggering other event. Each event marker can be recorded to disk for analysis within TrendManager Pro.

**Display groups:**

9 independent user-definable display screens and groups can be used to show a combination of pens, events, alarm summary and totaliser. Plant diagrams and mimics can be generated and then integrated into the recorder display in conjunction with traditional chart, bargraph and digital displays.

**APPLICATION SOFTWARE*****TrendManager Pro Suite***

The comprehensive recorder configuration can be set-up remotely using TrendManager Pro. Use TrendManager Pro to configure your recorder.

Intuitive software and help facilities ensure quick and easy setup of all the recorders parameters including scales, logging rates, chart speeds, display configuration, alarms. Transfer the configuration file from PC to recorder on a 3.5" disk.

TrendManager Pro will take recorded data from disk and store it on the comprehensive data base. Data and configurations from many recorders can be handled by TrendManager Pro, and once on the database, analysis may begin.

TrendManager Pro allows quick and easy analysis of all trend, event and alarm information. Each graph is totally independent allowing archived data to be compared across recorders, channels and time. Data can be compressed or expanded in the horizontal and vertical axis. Charts can be further enhanced by zooming.

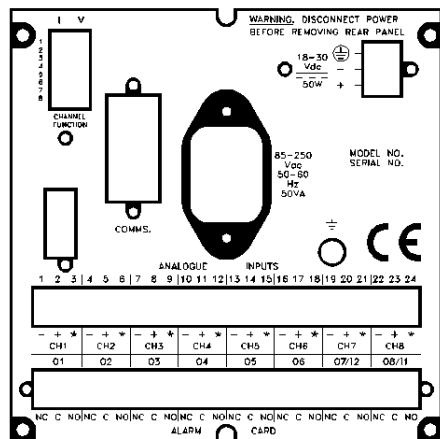
Up to 32 recorders can be linked to provide real time display of process variables - plus data retrieval - using a dedicated PC and a standard Windows platform. Optional Modbus protocol can be utilised with any independent SCADA package.

Any printer supported by Windows may be used to obtain hard copies of archived data, either in graphical or tubular form.

System requirements for both packages are:

- 200 MHz pentium processor or higher
- 3.5" Floppy disk drive, CD-ROM drive
- Monitor recommended screen resolution 1024 x 768 minimum requirement, high colour
- Windows 98, 2000, ME, XP, NT ver. 4.0 with Service pack 3, onwards
- 32 Mbyte of RAM (64 Mbyte recommended)
- 10 Mbyte free hard disk space
- A mouse

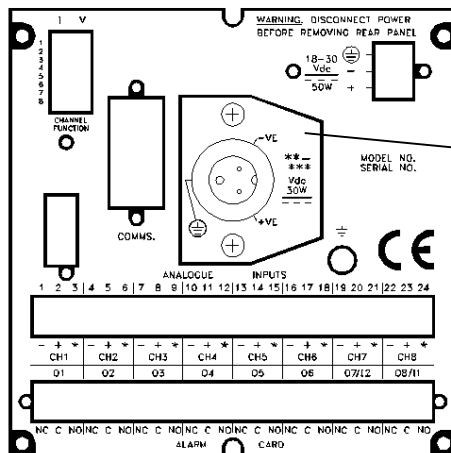
## Getting Connected



ac Rear Panel

ac Power

ac Supply is connected via the standard configuration IEC chassis plug on the rear panel, labelled 85-250 Vac 50-60 Hz



dc Rear Panel, low voltage 12 or 24Vdc

Low voltage for 12 or 24Vdc

dc Power

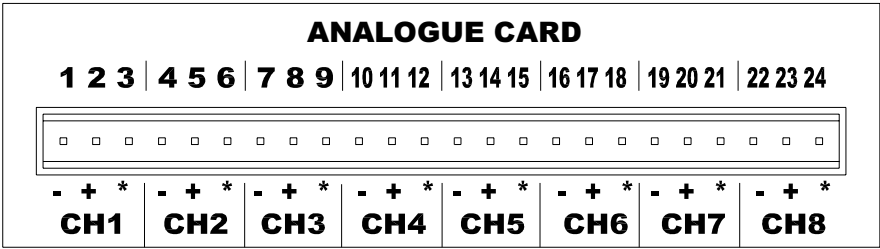
Power to the low voltage dc variant is connected via a rectangular 3-pin plug in position shown.

Getting Connected

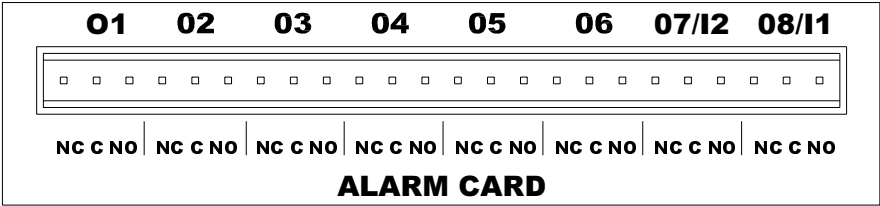
Standard Analogue card

Universal analogue card

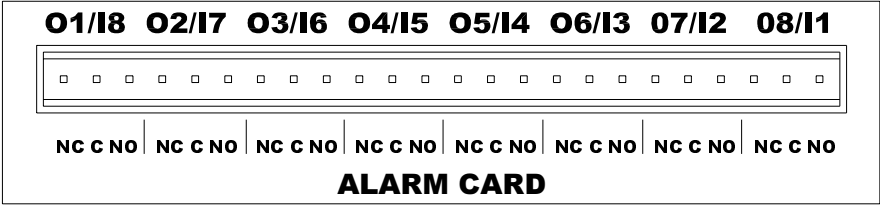
Transmitter power supply card



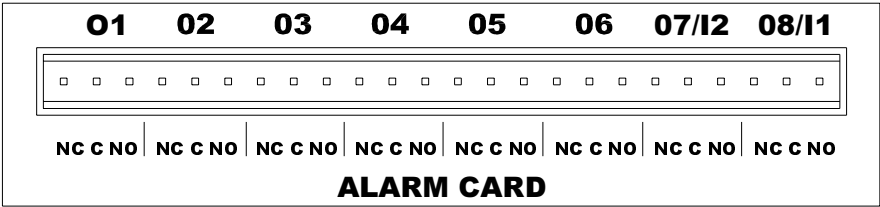
4 & 8 Relay Alarm Card



8 Input/Output Alarm Card



Digital Inputs



**Warranty/Remedy**

Honeywell warrants goods of its manufacture as being free of defective material and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.

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INTERNET: [www.honeywell.com/imc](http://www.honeywell.com/imc)

**ARGENTINA**

HONEYWELL S.A.I.C.  
BELGRANO 1156  
BUENOS AIRES  
ARGENTINA  
Tel. : 54 1 383 9290

**ASIA PACIFIC**

HONEYWELL ASIA  
PACIFIC Inc.  
Room 3213-3225  
Sun Kung Kai Centre  
N° 30 Harbour Road  
WANCHAI  
HONG KONG  
Tel. : 852 829 82 98

**AUSTRALIA**

HONEYWELL LIMITED  
5 Thomas Holt Drive  
North Ryde Sydney  
NSW AUSTRALIA 2113  
Tel. : 61 2 353 7000

**AUSTRIA**

HONEYWELL AUSTRIA  
G.m.b.H.  
Handelskai 388  
A1020 VIENNA  
AUSTRIA  
Tel. : 43 1 727 800

**BELGIUM**

HONEYWELL S.A.  
3 Avenue de Bourget  
B-1140 BRUSSELS  
BELGIUM  
Tel. : 32 2 728 27 11

**BRAZIL**

HONEYWELL DO BRAZIL  
AND CIA  
Rua Jose Alves Da  
Chunha  
Lima 172  
BUTANTA  
05360.050 SAO PAULO  
SP  
BRAZIL  
Tel. : 55 11 819 3755

**BULGARIA**

HONEYWELL EOOD  
14, Iskarsko Chausse  
POB 79  
BG- 1592 Sofia  
BULGARIA  
Tel. : 359-791512/ 794027/  
792198

**CANADA**

HONEYWELL LIMITED  
THE HONEYWELL  
CENTRE  
529 Mc Nicoll Avenue  
M2H 2C9 NORTH YORK,  
ONTARIO  
CANADA  
Tel. : 416 502 5200

**CZECH**

**REPUBLIC**  
HONEYWELL, Spol.s.r.o.  
Budejovicka 1  
140 21 Prague 4  
Czech Republic  
Tel. : 42 2 6112 3434

**DENMARK**

HONEYWELL A/S  
Automatikvej 1  
DK 2860 Soeborg  
DENMARK  
Tel. : 45 39 55 56 58

**FINLAND**

HONEYWELL OY  
Ruukintie 8  
FIN-02320 ESPOO 32  
FINLAND  
Tel. : 358 0 3480101

**FRANCE**

HONEYWELL S.A.  
Bâtiment « le Mercur »  
Parc Technologique de St  
Aubin  
Route de l'Orme  
(CD 128)  
91190 SAINT-AUBIN

**FRANCE**

Tel. from France:  
01 60 19 80 00  
From other countries:  
33 1 60 19 80 00

**GERMANY**

HONEYWELL AG  
Kaiserleistrasse 39  
D-63067 OFFENBACH  
GERMANY  
Tel. : 49 69 80 64444

**HUNGARY**

HONEYWELL Kft  
Gogol u 13  
H-1133 BUDAPEST  
HUNGARY  
Tel. : 36 1 451 43 00

**ICELAND**

HONEYWELL  
Hataekni .hf  
Armuli 26  
PO Box 8336  
128 reykvjik  
Iceland

**ITALY**

HONEYWELL S.p.A.  
Via P. Gobetti, 2/b  
20063 Cernusco Sul  
Naviglio  
ITALY  
Tel. : 39 02 92146 1

**MEXICO**

HONEYWELL S.A. DE CV  
AV. CONSTITUYENTES  
900  
COL. LOMAS ALTAS  
11950 MEXICO CITY  
MEXICO  
Tel. : 52 5 259 1966

**THE**

**NETHERLANDS**  
HONEYWELL BV  
Laaderhoogweg 18  
1101 EA AMSTERDAM ZO  
THE NETHERLANDS  
Tel. : 31 20 56 56 911

**NORWAY**

HONEYWELL A/S  
Askerveien 61  
PO Box 263  
N-1371 ASKER  
NORWAY  
Tel. : 47 66 76 20 00

**POLAND**

HONEYWELL Sp.z.o.o.  
Ul Domainewksa 41  
02-672 WARSAW  
POLAND  
Tel. : 48 22 606 09 00

**PORTUGAL**

HONEYWELL  
PORTUGAL LDA  
Edificio Suecia II  
Av. do Forte nr 3 - Piso 3  
2795 CARNAXIDE  
PORTUGAL  
Tel. : 351 1 424 50 00

**REPUBLICOF**

**IRELAND**  
HONEYWELL  
Unit 1  
Robinhood Business Park  
Robinhood Road  
DUBLIN 22  
Republic of Ireland  
Tel. : 353 1 4565944

**REPUBLICOF**

**SINGAPORE**  
HONEYWELL PTE LTD  
BLOCK 750E CHAI CHEE  
ROAD  
06-01 CHAI CHEE IND.  
PARK  
1646 SINGAPORE  
REP. OF SINGAPORE  
Tel. : 65 2490 100

**REPUBLIC OF SOUTH**

**AFRICA**  
HONEYWELL  
Southern Africa  
PO BOX 138  
Milnerton 7435  
REPUBLIC OF SOUTH  
AFRICA  
Tel. : 27 11 805 12 01  
**ROMANIA**  
HONEYWELL Office  
Bucharest  
147 Aurel Vlaicu Str.,  
Sc.Z.,  
Apt 61/62  
R-72921 Bucharest  
ROMANIA  
Tel:40-1 211 00 76/  
211 79

**RUSSIA**

HONEYWELL INC  
4 th Floor Administrative  
Building of AO "Luzhniki"  
Management  
24 Luzhniki  
119048 Moscow  
RUSSIA  
Tel. : 7 095 796 98 00/01

**SLOVAKIA**

HONEYWELL Ltd  
Mlynske nivy 73  
PO Box 75  
820 07 BRATISLAVA 27  
SLOVAKIA  
Tel. : 421 7 52 47 400/ 425

**SPAIN**

HONEYWELL S.A.  
Factory  
Josefa Valcarcel, 24  
28027 MADRID  
SPAIN  
Tel. : 34 91 31 3 61 00

**SWEDEN**

HONEYWELL A.B.  
S-127 86 Skarholmen  
STOCKHOLM  
SWEDEN  
Tel. : 46 8 775 55 00

**SWITZERLAND**

HONEYWELL A.G.  
Hertistrasse 2  
8304 WALLISELLEN  
SWITZERLAND  
Tel. : 41 1 831 02 71

**TURKEY**

HONEYWELL  
Otomasyon ve Kontrol  
Sistemlen San ve Tic A.S.  
(Honeywell Turkey A.S.)  
Emirhan Cad No 144  
Barbaros Plaza C. Blok Kat  
18  
Dikilitas 80700 Istanbul  
TURKEY  
Tel. : 90-212 258 18 30

**UNITED**

**KINGDOM**  
HONEYWELL  
Unit 1,2 &4 Zodiac House  
Calleva Park  
Aldermaston  
Berkshire RG7 8HW  
UNITED KINGDOM  
Tel. : 44 118 906 2600

**U.S.A.**

HONEYWELL INC.  
INDUSTRIAL  
CONTROLS DIV.  
1100 VIRGINIA DRIVE  
PA 19034-3260  
FT. WASHINGTON  
U.S.A.  
Tel. : 1-800-343-0228

**VENEZUELA**

HONEYWELL CA  
APARTADO 61314  
1060 CARACAS  
VENEZUELA  
Tel. : 58 2 239 0211

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