KnowzNet™

8-Sensor Gas Detection System

FEATURES

- Wide selection of target gases
- PPM, % LEL and % volume monitoring
- 8 bi-color LEDs indicate sensor states
- LCD and 4-button keypad user interface
- Isolated master relay (DPDT)
- Optional dry-contact zone relays (SPST)
- Manual or auto-resetting relay operation
- 80dB alarm beeper
- 12VDC powering; up to 60VDC optional
- Panel powers remote sensor heads
- Optional 2-, 4- or 8-hour battery back-up
- Sensors connect using 2-pair cable
- Up to 300' (100m) sensor cable length
- Connection via RJ-11 or terminal blocks
- PC access via serial port or USB

KnowzNet™ Panel

KnowzNet™ Sensor Head

DESCRIPTION

KnowzNet™ is a control panel-based fixed gas monitoring system supporting up to 8 remote sensor heads.

Sensors are available for a number of combustible and toxic gases - as well as for oxygen, helium and refrigerant gases.

Sensor heads can be installed up to 300 feet (100m) away from the panel using 4-conductor cable such as Station wire or computer cables.

SCOPE

This document provides a technical description of KnowzNet™ control panels only. For technical parameters relating to sensor heads, please see the specific datasheet for the sensor head of interest. For details relating to the operation of the panel's user interface (menu system), please see the KnowzNet™ Control Panel User Guide. For information on connecting to the panel via the USB or serial port, please see the NeoPort™ program documentation.

1 - FUNCTIONAL DESCRIPTION

1.0 - OVERVIEW

KnowzNet™ is an 8-channel data acquisition and control system specifically designed to collect and respond to data from remote sensing heads.

Up to 8 remote sensors may be connected to the panel using 4-conductor cable. Port interface connectors take the form of RJ-11 (telephony) jacks, pin headers, or terminal blocks and provide power to the remote sensors from the panel's local power supply.

Remote sensing heads can range from gas sensing elements to environmental and security sensors.

The panel's microcontroller reads the amplified analog signals of the remote sensors in a round robin fashion and converts them to a digital format for normalization and interpretation. Sensor data are digitally filtered to reject burst noise and other spurious events. Where necessary, sensor signals are compensated for environmental dependencies and are scaled according to calibration data stored in the panel's memory.

Once sensor signals have been translated into intelligible readings they are presented for viewing on the panel's LCD display in real time. Sensor readings are also compared to action levels stored in the panel's memory and, when they exceed preset thresholds, can be made to trigger the panel's alarm lamps, beeper and relay(s).

The panel's user interface is composed of an interactive menu system and is accessed via the LCD display and operator keypad. This interface permits the inspection and modification of all parameters relating to the panel's operation as well as the viewing of stored (historic) alarm event details. Additionally, the panel may be accessed via the USB or serial port in conjunction with the Neodym NeoPort™ application program.

KnowzNet™ panels are powered using direct current (DC). The standard operating voltage is 12VDC. Switch-mode step-down power supplies can be integrated at order time, which permit operation of the panel at 24 and 48VDC.

For uninterrupted operation during AC power failures the panel may be wired into a redundant power bus, or may be ordered with a 2, 4, or 8-hour back-up battery.

1.1 – SYSTEM COMPONENTS

LCD DISPLAY

A 2-line by 8-character LCD display is used to display sensor readings and to interact with the panel's menu system.

INDICATOR LAMPS

Eight bicolor light-emitting diodes provide visual indication of the state of each sensor port. The indications are as follows:

Lamp State	Indication
Off:	Sensor port disabled (off)
Steady green:	Sensor OK (normal)
Blinking green:	Sensor accessed in menu
Steady red:	Sensor in alarm
Blinking red:	Sensor error/disconnected

OPERATOR KEYPAD

Four pushbutton switches marked Up, Down, Enter and Clear permit navigation of the panel's menu system and modification of panel operating parameters.

USB INDICATOR LAMP

This LED illuminates when aconnection is established with a USB host.

ALARM BEEPER

The panel contains an audio transducer that beeps at a ½ second rate when any sensor goes into alarm. The operator can mute this device.

MASTER RELAY

A double-pole double-throw (DPDT) relay is provided to switch external loads whenever any sensor goes into alarm. Two sets of electrically isolated switch contacts are accessible via a terminal block.

Even though the relay provides both normally open and normally closed contacts, the relay can be configured to be normally activated so that a sensor alarm, a sensor error, or a power failure may toggle the relay.

The relay can be configured to be auto-clearing – i.e. to reset itself when the alarm condition is removed, or latching – such that an operator key press is required to acknowledge the activation.

ZONE RELAYS (OPTIONAL)

Up to eight additional relays (one per sensor port) may be installed at order time to switch individually in response to their associated sensor.

These devices are single-pole single throw (SPST) types and can be configured to be normally open or normally closed. They can further be configured to self-clear or to require a manual reset.

SENSOR PORTS

Sensor heads connect to the panel via connectors whose type is selected at order time. These can take the form of plugs, headers or terminal blocks.

Ports drive 12VDC power to the remote sensor heads and input 0-5VDC analog signals from the remote sensor amplifiers.

PC INTERFACE PORTS

A serial port and USB slave interface are provided to allow the panel to be connected to a PC.

The Neodym NeoPort™ PC application program is able to access the panel via either of these ports and may be used to perform panel set-up functions more conveniently than via the panel's LCD/keypad menu system. Additionally the program may be used to monitor the panel sensors remotely.

The NeoPort™ program is also used to install drivers for new sensors.

When necessary, the panel's firmware may be upgraded via the serial port using a Neodym utility program.

POWERING SUB-SYSTEM

The operating voltage of panel devices is 5VDC. 12VDC is used to drive power over long cables to sensor heads where it is stepped down to and regulated at 5VDC. Thus the basic input supply voltage of the panel is 12VDC.

Panels that accept a higher input supply may be ordered. These special panels include a switch-mode power supply that steps the supply voltage down to 12 volts from either 40VDC or 60VDC. In this way, panels may be powered from 24VDC or 48VDC electrical systems.

BACK-UP BATTERY (OPTIONAL)

Panels may be ordered that provide for the connection of an external 12VDC battery that may be used to power the system in the event of a power failure. The battery interface performs trickle charging and is therefore only suitable for stand-by operation.

2 – SPECIFICATIONS

TABLE 2.1 – Data Acquisition Parameters

Parameter	Value	Notes
Number of input ports	8	
Port input range	0 – 5 VDC	
Sampling resolution	8 bits	
Sampling accuracy	½ LSB	

TABLE 2.2 – Controller Parameters

Parameter	Value	Notes
Controller type	MC68HC811 MCU	
Memory	EEPROM	10 year retention
Clock	Date & time	Battery backed-up

TABLE 2.3 – Input/Output Connections

Parameter	Value	Notes
Sensor port connectors	• RJ-11 (6-4) • 3.5 mm terminal blocks • 2mm Hirose “DF3”	- Telephony jacks, 4 conductor - - Keyed headers for crimp sockets
Master relay access	2 x 3-terminal blocks	3.5mm, NO, NC and common
Zone relay access	8 x 2-terminal blocks	3.5mm, NO or NC
Serial Port connector	DB-9 female	Rx, TX, Ground
USB Port connector	Type B	USB 1.0 compatible
Serial/USB port protocol	Neodym proprietary	
Primary power connectors	2.1 mm radial jacks	2 jacks provided, center-negative
Back-up battery connection	4-pin Molex header	“Mini-Fit Jr.” Molex p/n 39-30-3045

TABLE 2.4 – Operator Interface

Parameter	Value	Notes
Text display type	2-line x 8 char. LCD	
Text viewing area	31 x 14 mm	
Display update rate	0.1 seconds	
Operator keypad	Up/Down/Enter/Clear	Pushbutton switches

TABLE 2.5 – Indicators and Activations

Parameter	Value	Notes
Action levels	1 to 4	Number/level user-programmable
Action level activations	LEDs/beeper/relay(s)	User programmable
Indicator lamps	8 x Red/green LEDs	
Alarm beeper	80dB at 30 cm piezzo	

TABLE 2.6 – Relay Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Master relay (SPDT)					
Switch voltage:		-	-	220	VDC
Switch current:		-	-	2	A
Carry current:		-	-	3	A
Contact resistance:		-	-	0.05	Ohm
Insulation resistance:		-	-	10^8	Ohm
Optional zone relays (SPST)					
Switch voltage:		-	200	-	VDC
Switch current:		-	0.5	-	A
Carry current:		-	1.2	-	A
Contact resistance:		-	0.15	-	Ohm
Insulation resistance:		-	10^{10}	-	Ohm

TABLE 2.7 – AC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Warm-up time	T_{WARMUP}	-	60	-	S
Fundamental operating frequency	F_{OSC}	-	4	-	MHz
COP watchdog time-out time	T_{COP}	-	32.8	-	mS
ADC sampling rate	T_{SAMP}	-	32.8	-	mS
Signal averaging period	T_{AVG}	-	500	-	mS
Serial port baud rate	-	-	4800	-	Bits/S
USB port speed	-	-	12		Mb/S

TABLE 2.8 – Environmental Parameters

Parameter	Symbol	Value	Unit
Storage temperature	t_{STG}	-40 to +85	Deg. C.
Operating temperature range	t_{OP}	0 to +70	Deg. C.
Operating humidity	-	0 to 95	% R.H.

2.9 – OPERATING POWER

ABSOLUTE MAXIMUM RATINGS

Note: Maximum ratings are the extreme limits to which the panel can be exposed without permanent damage. The panel is not guaranteed to operate properly at maximum ratings.

TABLE 2.9.1 - Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Supply voltage			
I1 Models:	V_{PWRIN}	15	VDC
I2 Models:		45	
I3 Models:		60	

INPUT SUPPLY VOLTAGE

Note: Permanent device damage may occur above the specified operating voltage range. Operating the panel below the required input supply voltage may lead to unstable operation, reduced sensor sensitivity, and/or sensor failure indications.

TABLE 2.9.2 – Operating Input Voltage Range

Parameter	Symbol	Value	Unit
Operating voltage range			
I1 Models:	V_{PWRIN}	12 to 14	VDC
I2 Models:		12 to 40	
I3 Models:		12 to 60	

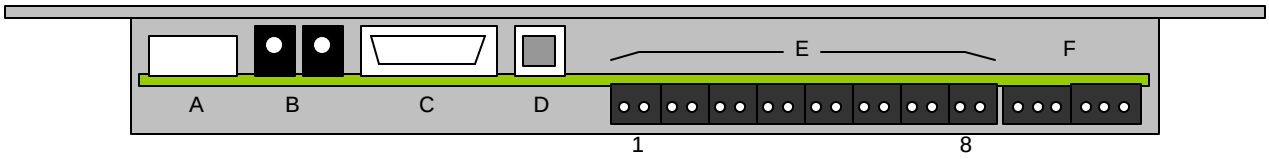
POWER CONSUMPTION

TABLE 2.9.3 – Supply current

Parameter	Symbol	Min	Typ	Max	Unit
Supply current					
I1 models: V_{PWRIN} = 12VDC:	I_{PWRIN}	-	250	275	mA
I2/I3 models: V_{PWRIN} = 24VDC:		-	150	170	
I3 models: V_{PWRIN} = 48VDC:		-	80	90	

3 – ELECTRICAL INTERFACE

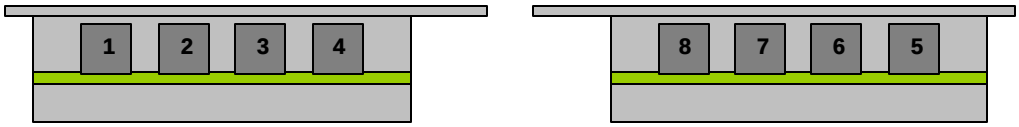
Figure 3.1 – Location of Panel Interface Connectors



LEGEND

A	Back-up battery connector (Molex Mini-Fit Jr)
B	Primary input power jacks (2.1 mm radial, center-negative)
C	Serial Port (DB-9)
D	USB connector
E	Zone relay terminal blocks (3.5mm)
F	Master relay terminal blocks (3.5mm)

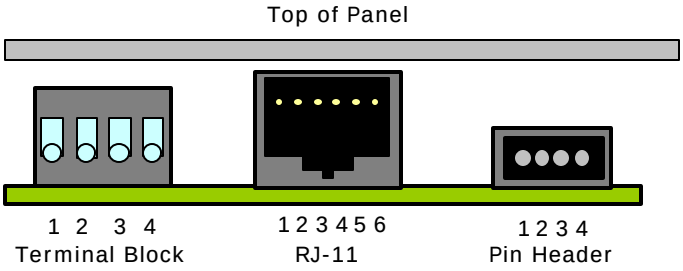
Figure 3.2 – Location of Panel Sensor Connectors



View from left

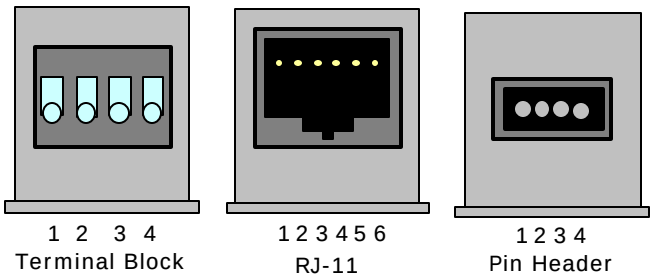
View from right

Figure 3.3 – Sensor Connector Signals – Panel Side



SIGNAL	TRM. BLK. "K1"	RJ-11 "K2"	HEADER "K3"
PWR IN (12VDC)	4	5	4
SIG OUT (0-5VDC)	3	3	3
Ground (Common)	1	2	1

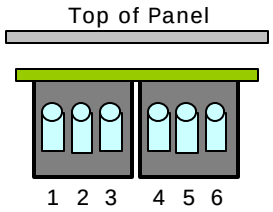
Figure 3.4 – Sensor Connector Signals – Sensor Head Side



SIGNAL	TRM. BLK. "K1"	RJ-11 "K2"	HEADER "K3"
PWR IN (12VDC)	1	2	1
SIG OUT (0-5VDC)	2	4	2
Ground (Common)	4	5	4

PLEASE NOTE: When terminating cables with RJ-11 plugs, the signals must cross over similarly to telephone cords.

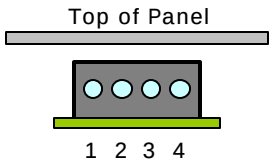
Figure 3.5 – Master Relay Contacts



PINS	FUNCTION
1, 4	Normally-open
2, 5	Common
3, 6	Normally-closed

Note: Contacts described in relay's activated state

Figure 3.6 – Battery Connector Pins



PINS	FUNCTION
1, 4	+12VDC Terminal (Positive)
2, 3	Ground Terminal (Negative)

4 – PHYSICAL DIMENSIONS

FIGURE. 4.1 – Panel Dimensions

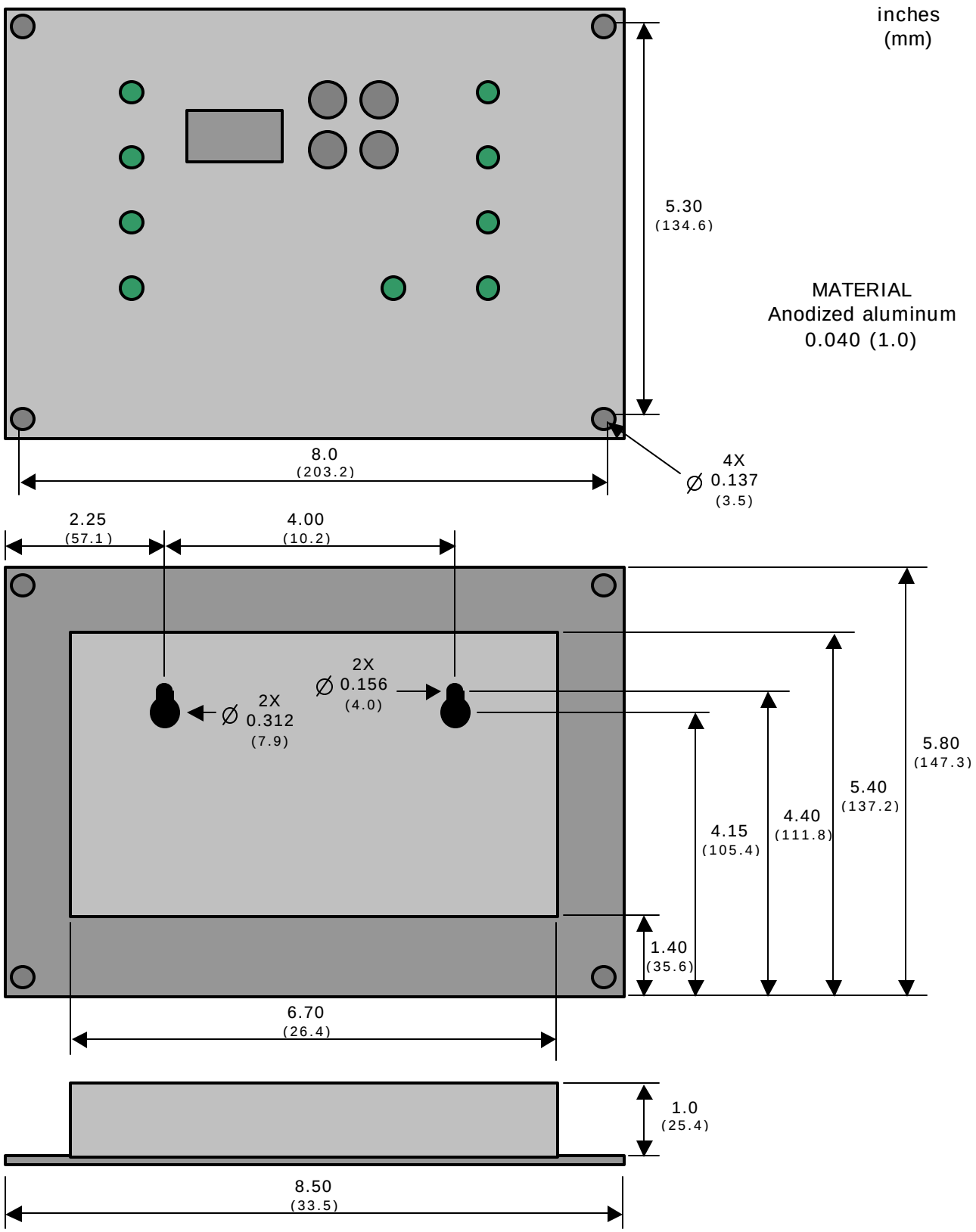


FIGURE. 4.2 – Sensor Head Dimensions

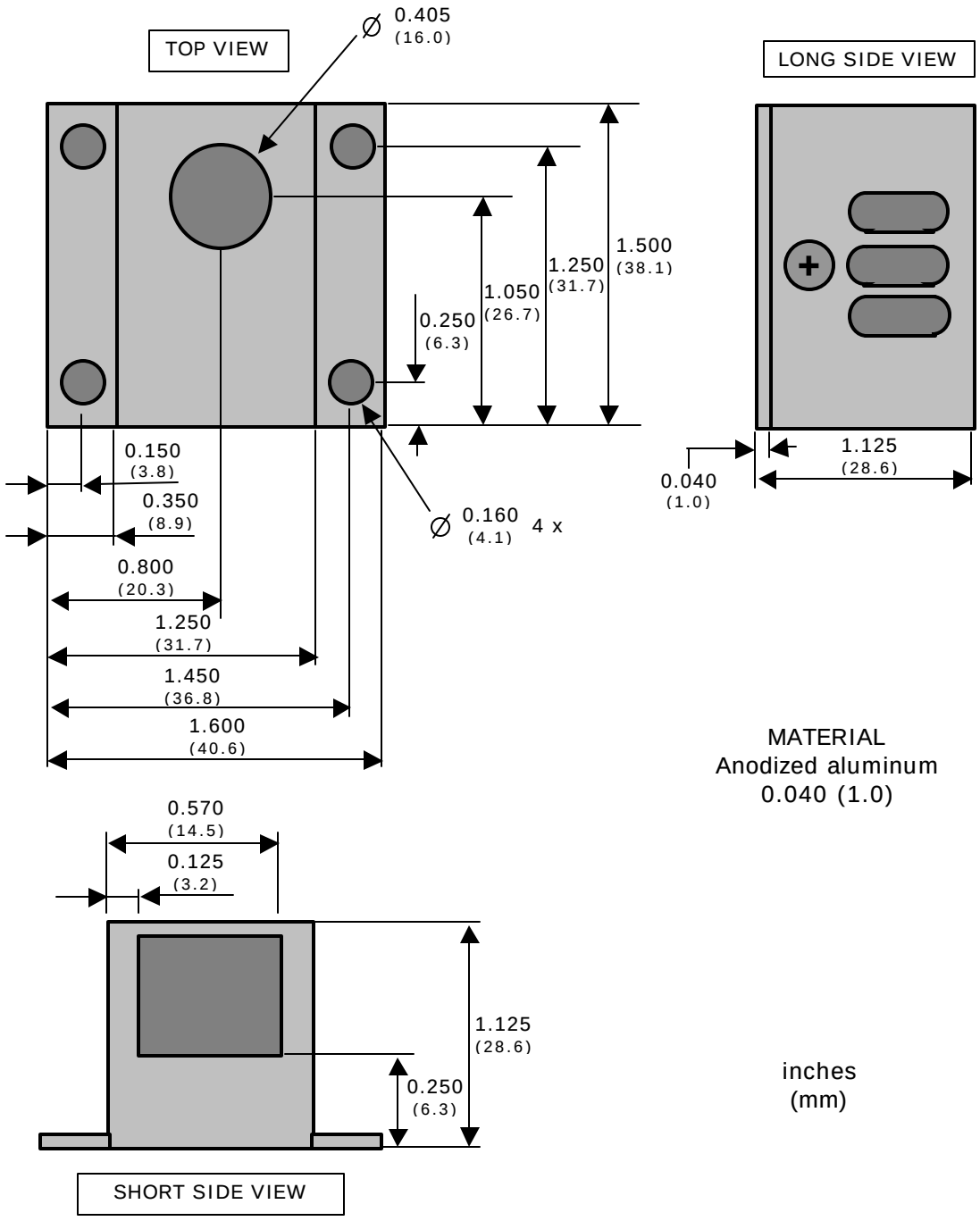
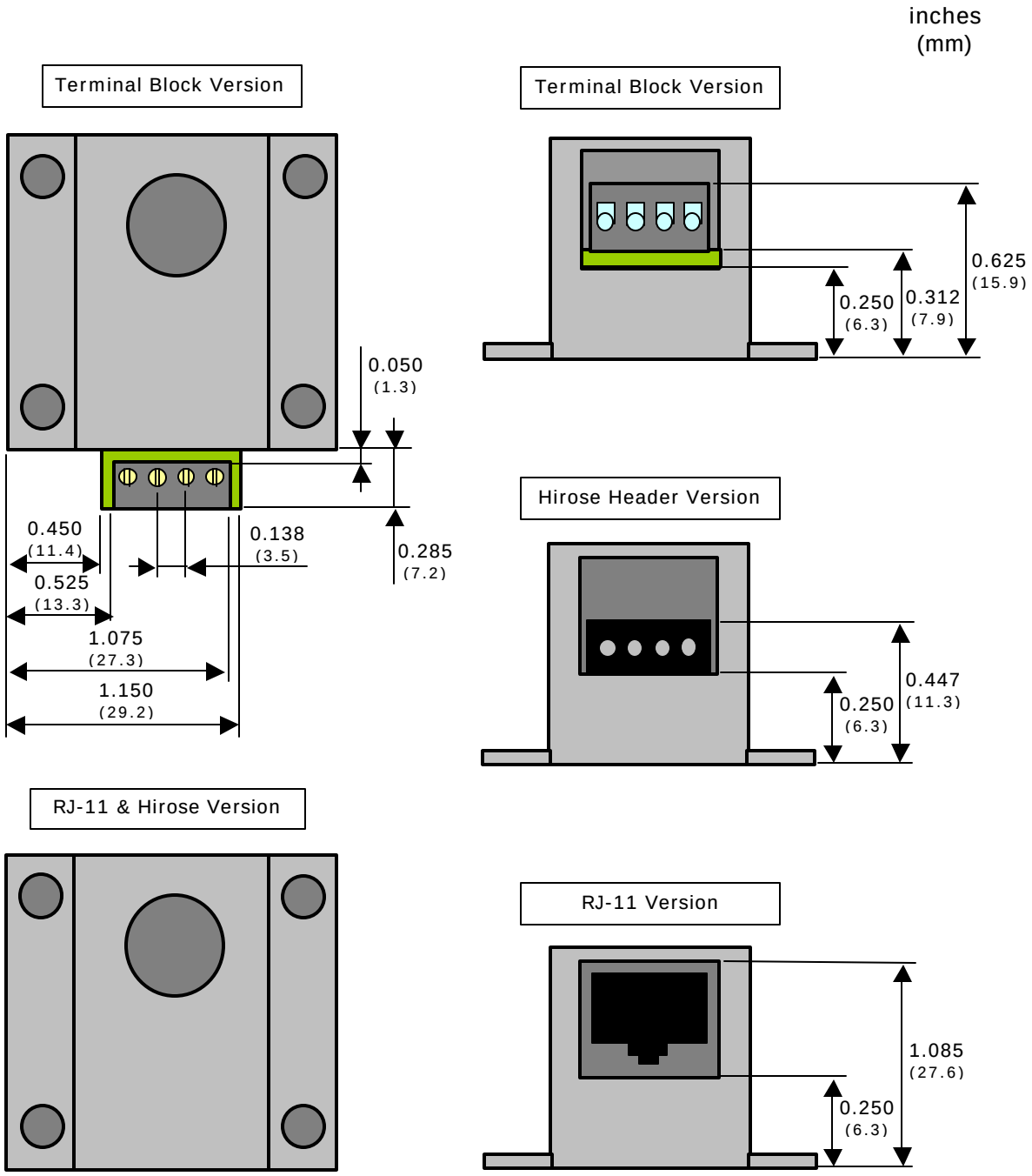
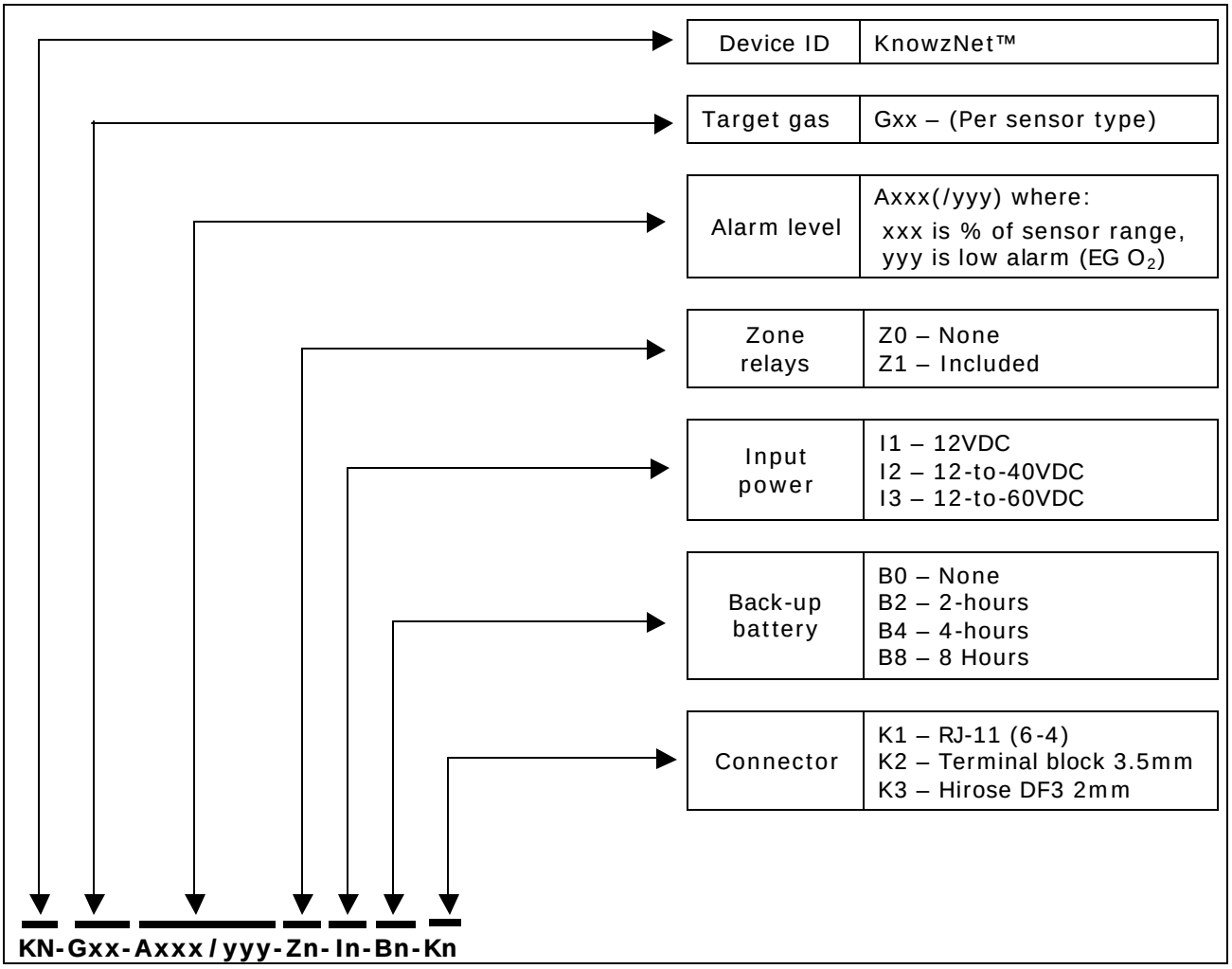


FIGURE. 4.3 – Sensor Head Connector Dimensions



5 – SALES & TECHNICAL SUPPORT

5.1 – PART NUMBERING



5.2 – CONTACT INFORMATION

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