SmartBlock Analog Input Module, HE579ADC570/970

12 Input Channels, 5V / 10V / 4-20mA / 20mA, CsCAN

1. SPECIFICATIONS

	ADC570	ADC970		
ANALOG IN				
Number of input points	6	12	**Additional error for temperatures other than 25°C**	0.01%/°C
Input ranges	5, 10V DC 4-20, 20mA DC 10 K Thermistor		**Isolation**	1000V DC IEC61010-1 300V RMS
Resolution	16 bits			
Accuracy, 25°C **Input Impedance**	0.1% V: 1 Megohm mA: 75 Ohms		**Isolation Method**	Magnetic
			Maximum Continuous Overload	10V: 0 to 30V 20mA: 30mA, 0 to 30V
Register Value for Nominal Full Scale	32000		**Programmable Filter Time**	0.01 to 1.28 seconds
Conversion Time	10ms for all channels		**Filter Modes**	Running average or adaptive
GENERAL				
Required Power (steady state)	1.8W (75mA @ 24VDC)		**Pollution degree**	2 or lower
Required Power (inrush)	8A @ 24VDC for 5ms		**Operating temperature**	0° to 55°C
Atmosphere	Free from corrosive gases and excessive dust		**Storage temperature**	-25° to 70°C
			Operating and storage humidity	5 to 95% non-condensing
Cooling method	Self-cooling			
Altitude for use	Up to 2,000m		**Weight**	8.0 oz (227 g)

VIBRATION	**Frequency**	**Acceleration**	**Amplitude**	**Sweep Count**
Occasional Vibration	10 ≤ f < 57 Hz	—	0.075 mm	10x in each direction for X, Y, Z
	57 ≤ f < 150 Hz	9.8 m/s² {1G}	—	
Continuous Vibration	10 ≤ f < 57 Hz	—	0.035 mm	10x in each direction for X, Y, Z
	57 ≤ f < 150 Hz	4.9 m/s² {0.5G}	—	

SHOCKS				
Maximum Shock acceleration	147 m/s² {15G}			
Duration time	11 ms			
Pulse wave	Half sine wave pulse (3x in each of X, Y, Z directions)			
Square wave impulse noise	AC: ±1,500V DC; DC: ±900V DC			
Electrostatic discharge	Voltage: 4 kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10 V/m			
Fast transient burst noise	**Severity level**	All power modules	Digital I/Os (use ≥ 24V)	Digital I/Os (use ≥ 24V) Analog Communication I/Os
	Voltage	2 kV	1 kV	0.25 kV

2. TECHNICAL SUPPORT

For assistance and manual updates, contact Technical Support at the following locations:

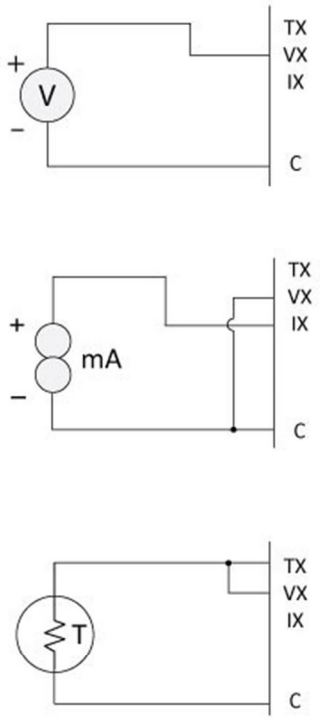
NORTH AMERICA

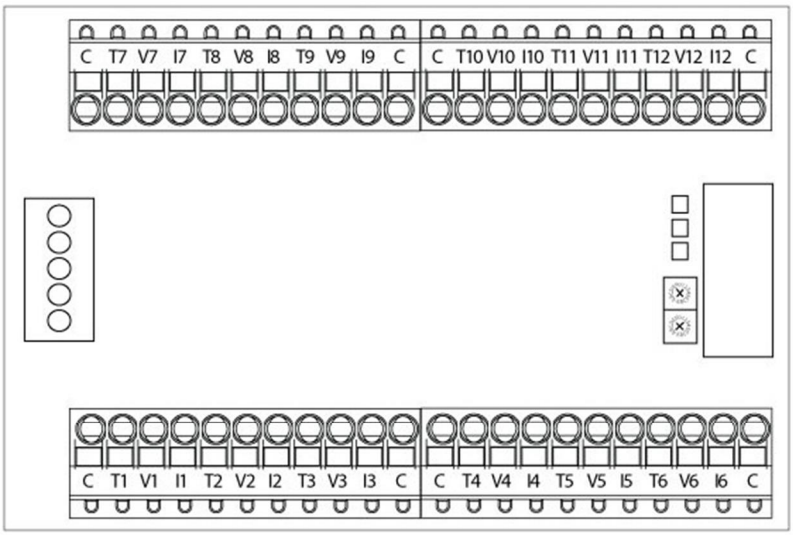
- Telephone: 317 916-4274, Fax: 317 639-4279
- http://www.heapg.com, Email: techsppt@heapg.com

EUROPE

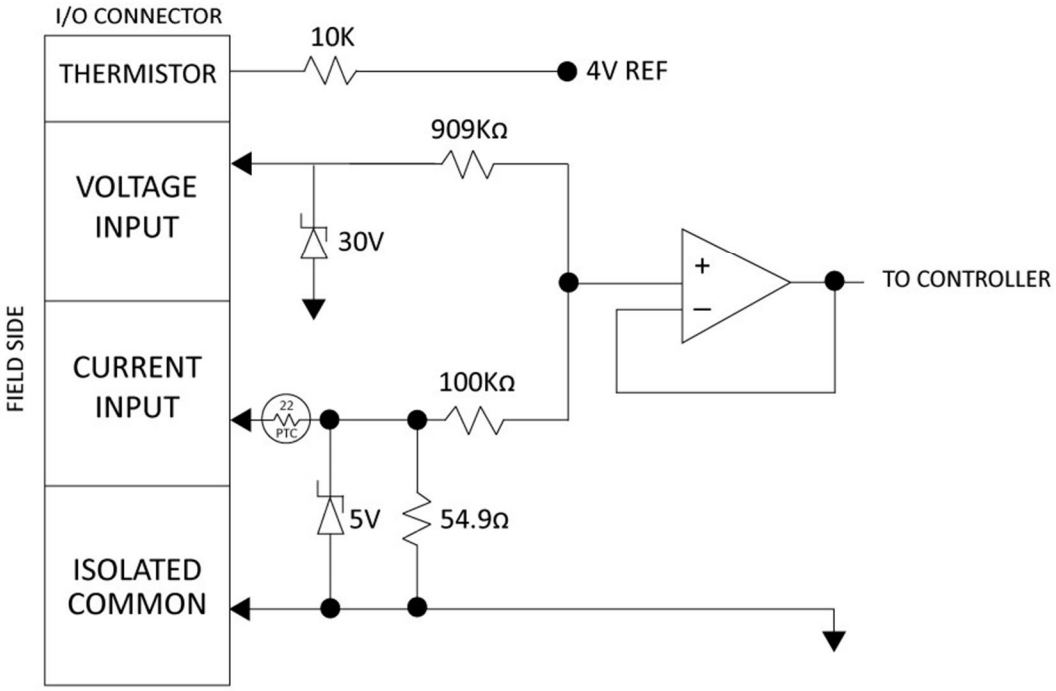
- Telephone: +353-21-4321266, Fax: +353-21-4321826
- http://www.horner-apg.com, Email: mailto:tech.support@horner-apg.com

3. WIRING





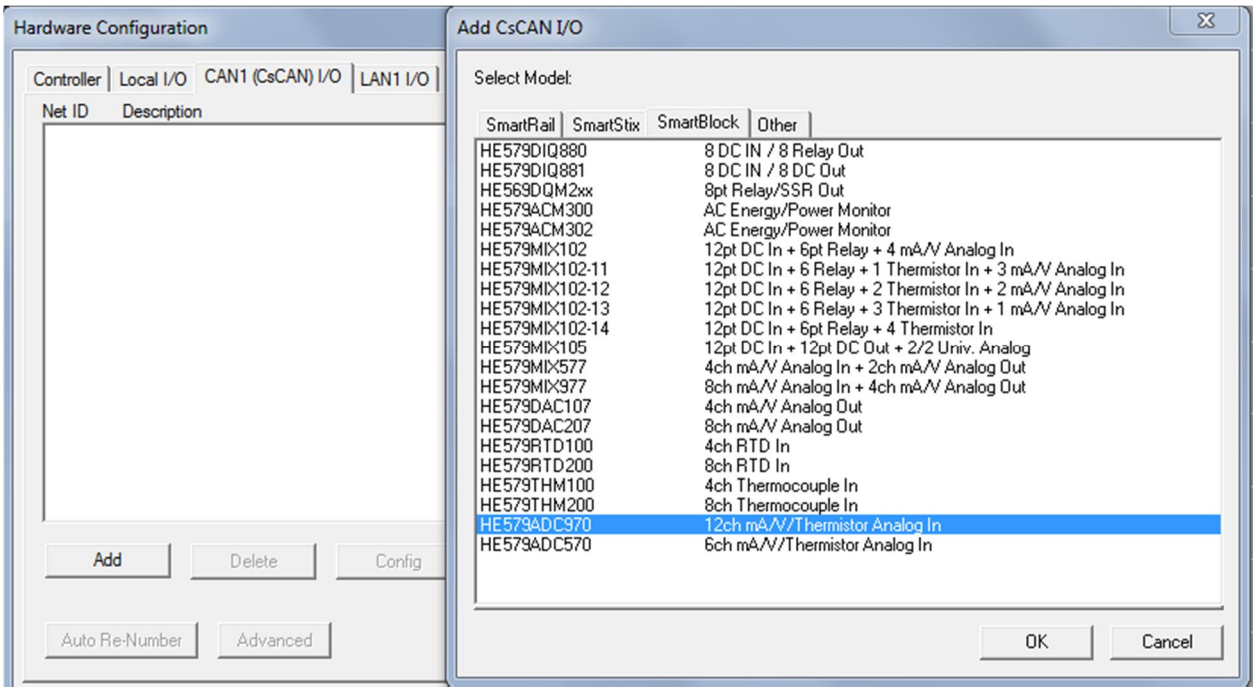
4. INTERNAL WIRING



5 CSCAPE CONFIGURATION

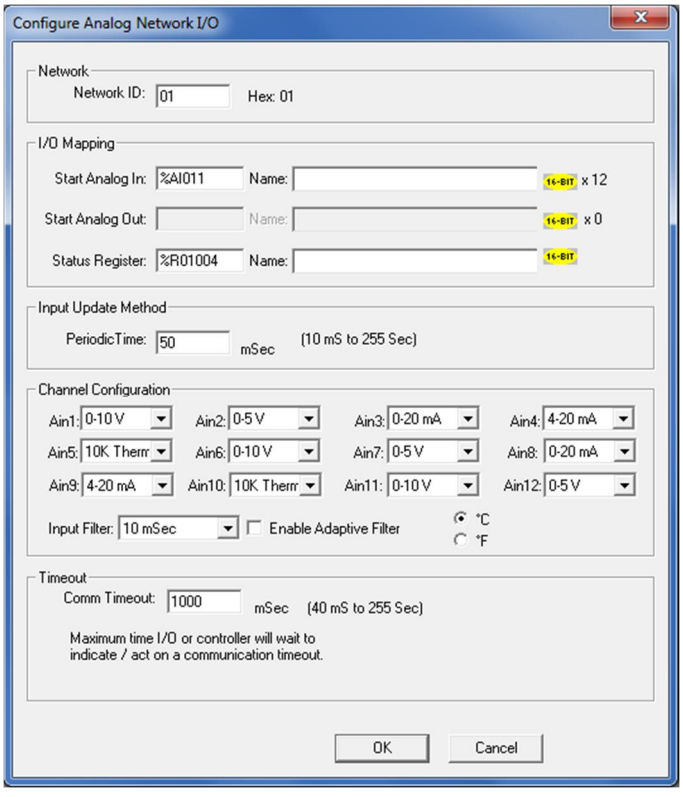
The HE579 ADC270/970 SmartBlock modules are configured through the **Hardware Configuration** menu in Cscape. To configure module and input settings:

1) Select **Hardware Configurtion** from the top navigation bar in Cscape.
2) Click on the **CAN1(CsCAN I/O)** or **CAN2(CsCAN I/O)** tab depending on the model of controller, then click **Add.**
3) Select the **SmartBlock** tab from the selector menu, and click on the appropriate ADC model being used, and click **OK**:



4) Configure the following menu by assigning registers to network and I/O mapping, and selecting input type from the dropdowns under **Channel Configuration,** desired update time, unit measurements, and timeout as seen below**:**

Note: With Thermistor configured, registers have a resolution of 0.1 degrees F or 0.1 degrees C.
ex) 250 = 25.0°



6 INPUT MODE AND PROGRAMMABLE FILTER CONFIGURATION USING NETPUT

NOTE: This section may be ignored when using the CsCAN I/O configuration tool in Cscape.

The network supplies configuration information to the HE579ADC970 in the Consumed Directed Digital Data Words sent to the HE579ADC970. In the first word, the low 12 bits, 1 through 12, are channel mode bits. A low mode bit selects 10V and a high mode bit selects 20mA. The next three bits, 13 through 15, are input digital filter time constant codes and the high bit, 16, is an adaptive filter enable bit. In the second word, the low 12 bits are channel scale bits. A low scale bit selects 10V or 20mA for the corresponding channel. A high scale bit selects 5V or 4-20mA. The upper four bits are unused. The fifth word selects thermistor. A high bit selects thermistor for the respective channel. Bit 16 selects 0.1°C when off and 0.1°F when on for all thermistor channels.

Bit	Channel
1	AI1
2	AI2
3	AI3
4	AI4
5	AI5
6	AI6

Bit	Channel
7	AI7
8	AI8
9	AI9
10	AI10
11	AI11
12	AI12

Each analog input on the HE579ADC970 has a single pole 345Hz (461uS) cutoff high frequency noise filter. In addition a second digital filter may be specified in the first configuration word with the following time constants.

Bit			Time Constant
15	**14**	**13**	
0	0	0	10 milliseconds (Nominal hardware scan rate)
0	0	1	15 milliseconds
0	1	0	35 milliseconds
0	1	1	75 milliseconds
1	0	0	155 milliseconds
1	0	1	315 milliseconds
1	1	0	635 milliseconds
1	1	1	1.275 seconds

This digital filter is useful for applications with significant amounts of random noise. The slower time constants, while yielding better noise suppression, take a longer time to settle after step changes and are also sensitive to impulse noise which is treated like Gaussian noise and averaged.

Bit 16 of the first configuration word may be set to specify an adaptive filter algorithm that:

1. Responds much more quickly to large step changes at slower time constants with full filtering of low level noise.
2. Suppresses impulse noise at the expense of slightly slower response at the shortest time constant settings. (Approximately 10 additional milliseconds)

NOTE: the actual system response time is network dependent.

7 INPUT CONVERSION FACTOR

The following table describes how real-world inputs are scaled into the controller. Given a known input voltage or current, the register data value may be calculated by using the conversion factor from the table. The following formula is used: **Data = Voltage or Current In / Conversion Factor**

Example: The user selects a voltage range of 5 V:

A. The known input voltage is 3 VDC.
B. Using the table, the conversion factor for the voltage range of 5 V is .00015625.
C. To determine the data value, the formula is used: Data = Vin / Conversion Factor
19200 = 3 VDC / 0.0001562

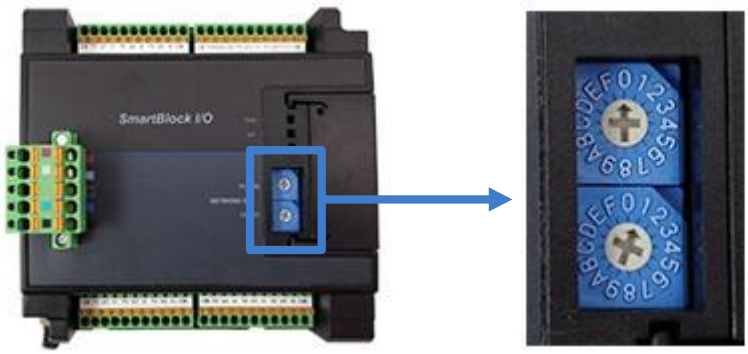
Conversion of Real-World Inputs into Register Values			
Selected Range	**Input mA or Volts**	**Data Out**	**Conversion Factor**
5.00 V	> +5.11	32767	0.00015625
	+5.00	32000	
	0.00	0	
10.00 V	> +10.23	32767	0.0003125
	+10.00	32000	
	0.00	0	
4.20mA	> +20.47	32767	0.0005
	+20.00	32000	
	+4.00	0	
20.00mA	> +20.47	32767	0.0006250
	+20.00	32000	
	0	0	

NOTE: For the 4 to 20mA range, the offset, 4mA, must first be subtracted from the physical input value before dividing by the scale factor to yield the expected %AQG value for the given input.

8 SETTING ID SWITCHES

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to following Conversion Table, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two identical switches.

NOTE: The CsCAN Baud Rate for SmartBlock I/O is fixed at 125KBaud



Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO
1	0	1	29	1	D	57	3	9	86	5	6	114	7	2	142	8	E	170	A	A	198	C	6	226	E	2
2	0	2	30	1	E	58	3	A	87	5	7	115	7	2	143	8	F	171	A	B	199	C	7	227	E	3
3	0	3	31	1	F	59	3	B	88	5	8	116	7	4	144	9	0	172	A	C	200	C	8	228	E	4
4	0	4	32	2	0	60	3	C	89	5	9	117	7	5	145	9	1	173	A	D	201	C	9	229	E	5
5	0	5	33	2	1	61	3	D	90	5	A	118	7	6	146	9	2	174	A	E	202	C	A	230	E	6
6	0	6	34	2	2	62	3	E	91	5	B	119	7	7	147	9	3	175	A	F	203	C	B	231	E	7
7	0	7	35	2	3	63	3	F	92	5	C	120	7	8	148	9	4	176	B	0	204	C	C	232	E	8
8	0	8	36	2	4	64	4	0	93	5	D	121	7	9	149	9	5	177	B	1	205	C	D	233	E	9
9	0	9	37	2	5	65	4	1	94	5	E	122	7	A	150	9	6	178	B	2	206	C	E	234	E	A
10	0	A	38	2	6	66	4	2	95	5	F	123	7	B	151	9	7	179	B	3	207	C	F	235	E	B
11	0	B	39	2	7	67	4	3	96	6	0	124	7	C	152	9	8	180	B	4	208	D	0	236	E	C
12	0	C	40	2	8	68	4	4	97	6	1	125	7	D	153	9	9	181	B	5	209	D	1	237	E	D
13	0	D	41	2	9	69	4	5	98	6	2	126	7	E	154	9	A	182	B	6	210	D	2	238	E	E
14	0	E	42	2	A	70	4	6	99	6	3	127	7	F	155	9	B	183	B	7	211	D	3	239	E	F
15	0	F	43	2	B	72	4	8	100	6	4	128	8	0	156	9	C	184	B	8	212	D	4	240	F	0
16	1	0	44	2	C	73	4	9	101	6	5	129	8	1	157	9	D	185	B	9	213	D	5	241	F	1
17	1	1	45	2	D	74	4	A	102	6	6	130	8	2	158	9	E	186	B	A	214	D	6	242	F	2
18	1	2	46	2	E	75	4	B	103	6	7	131	8	3	159	9	F	187	B	B	215	D	7	243	F	3
19	1	3	47	2	F	76	4	C	104	6	8	132	8	4	160	A	0	188	B	C	216	D	8	244	F	4
20	1	4	48	3	0	77	4	D	105	6	9	133	8	5	161	A	1	189	B	D	217	D	9	245	F	5
21	1	5	49	3	1	78	4	E	106	6	A	134	8	6	162	A	2	190	B	E	218	D	A	246	F	6
22	1	6	50	3	2	79	4	F	107	6	B	135	8	7	163	A	3	191	B	F	219	D	B	247	F	7
23	1	7	51	3	3	80	5	0	108	6	C	136	8	8	164	A	4	192	C	0	220	D	C	248	F	8
24	1	8	52	3	4	81	5	1	109	6	D	137	8	9	165	A	5	193	C	1	221	D	D	249	F	9
25	1	9	53	3	5	82	5	2	110	6	E	138	8	A	166	A	6	194	C	2	222	D	E	250	F	A
26	1	A	54	3	6	83	5	3	111	6	F	139	8	B	167	A	7	195	C	3	223	D	F	251	F	B
27	1	B	55	3	7	84	5	4	112	7	0	140	8	C	168	A	8	196	C	4	224	E	0	252	F	C
28	1	C	56	3	8	85	5	5	113	7	1	141	8	D	169	A	9	197	C	5	225	E	1	253	F	D

6 LEDS

HE579ADC570 and HE579ADC970 provide diagnostic and status LED indicators

Diagnostic LED Indicators		
Diagnostic LED	**State**	**Meaning**
MS indicates fault status of the Network	Solid Red	RAM or ROM test failed
	Blinking Red	I/O test failed
	Blinking Green	Module is in power-up state
	Solid Green	Module is running normally
NS Indicates fault status of the Network	Solid Red	Network Ack or Dup ID test failed
	Blinking Red	Network ID test failed
	Blinking Green	Module is in Life Expectancy default state
	Solid Green	Network is running normally

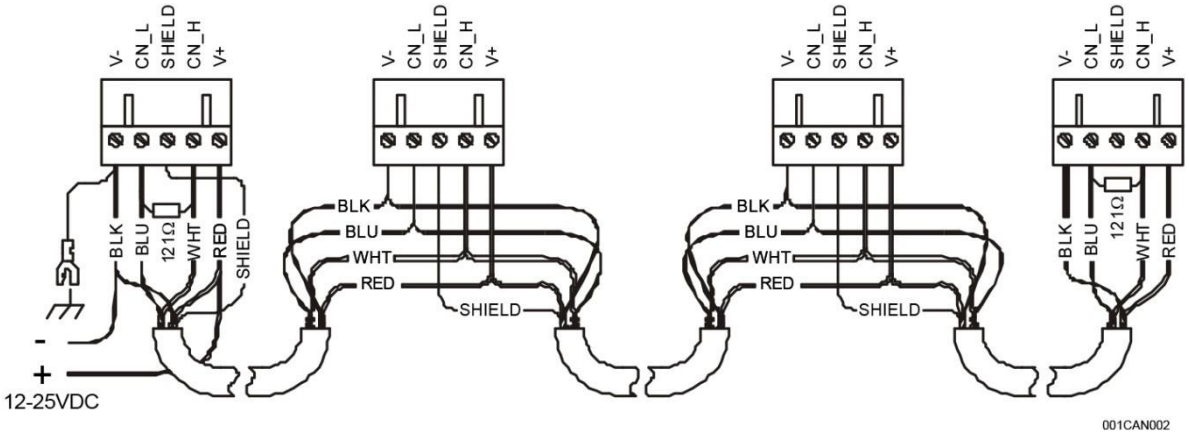
Status LED indicators – The Power Status LED illuminates **RED** when power is applied to the module. There are I/O status LED indicators for each of the Digital I/O points, which illuminate **RED** when the I/O point is ON.

7 NETWORK CABLE

For detailed wiring information, refer to Chapter Two in the **Control Station Hardware Manual** (MAN0227).
A handy checklist is provided that covers panel box layout requirements and minimum clearances.

1	V+
2	CAN_H
3	Shield
4	CAN_L
5	V-

Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A



CAN Wiring

NOTE: 12-24 VDC must be supplied to the network

8 INSTALLATION / SAFETY

a. All applicable codes and standards need to be followed in the installation of this product.
b. For I/O wiring (discrete,) use the following wire type: Belden 8441 or equivalent.
c. For detailed installation, refer to Chapter 2 in the Control Station Hardware Manual (MAN0227)
   - This manual provides a checklist that covers panel box layout requirements and minimum clearances.

WARNING: Consult user documentation.

WARNING: Electrical Shock Hazard