# HORNER
AUTOMATION GROUP

SmartBlock I/O Module — HE579MIX105 Isolated
12 DC Out, 12 DC In, 2 Analog In, 2 Analog Out

1. SPECIFICATIONS

Digital DC Inputs		Digital DC Outputs	
Inputs per Module	12 (6-4-2)	Outputs per Module	12
Isolated Input Commons	3	Isolated Output Commons	1
Input Voltage Range	±12 VDC / ±24 VDC	Output Type	Sourcing / 10 K Pull-Down
Absolute Max. Voltage	35 VDC Max.	Output Protection	Short Circuit
Input Impedance	10 kΩ	Output Current per point	0.0 - 0.5 A
Input Type	Positive/Negative Logic	Max. Total Current	4 A Continuous
Input Current Upper Threshold	±0.7mA	Max. Output Supply Voltage	30 VDC
Lower Threshold	±0.2mA	Minimum Output Supply Voltage	10 VDC
Input Voltage Max Upper Threshold	±8 VDC	Max. Voltage Drop at Rated Current	0.25 VDC
Min Lower Threshold	±3 VDC	Max. Inrush Current	650 mA per channel
Group and Bus Isolation	500VAC / VDC	Bus Isolation	500VAC / VDC

Analog Inputs, High Resolution			
Number of Channels	2	Thermocouple	Temperature Range
Input Ranges (Selectable)	0 - 10 VDC 0 – 20 mA 4 – 20 mA 100mV PT100 RTD, and J, K, N, T, E, R, S, B, C Thermocouples	B / R / S	2912°F to 32.0°F (1600°C to 0°C)
		C	4208°F to 32.0°F (2320°C to 0°C)
		E	1652°F to -328°F (900°C to -200°C)
		T	752.0°F to -400.0°F (400°C to -240°C)
Safe input voltage range	10 VDC: -0.5 V to +12 V 20 mA: -0.5 V to +6 V RTD / T/C: ±24 VDC	J	1382.0°F to -346.0°F (750°C to -210°C)
		K / N	2498.0°F to -400°F (1370°C to -240°C)
Nominal Resolution	10V, 20mA, 100mV: 14 Bits RTD, Thermocouple: 16 Bits	Thermocouple Common Mode Range	±10V
Input Impedance (Clamped @ -0.5 VDC to 12 VDC)	Current Mode: 100 Ω, 35mA Max. Continuous Voltage Mode: 500 kΩ, 35mA Max. Continuous	Converter Type	Delta Sigma
		Max. Error at 25°C (*excluding zero)	*4-20 mA ±0.10%* *0-20 mA ±0.10%* *0-10 VDC ±0.10%* RTD (PT100) ±1.0 °C 0-100 mV ±0.05%
%AI full scale	10 V, 20 mA, 100 mV: 32,000 counts full scale. RTD / T/C: 10 counts / °C-°F	Max Thermocouple Error (After Warm Up Time of One Hour)	±0.2% (±0.3% below -100°C)
Max. Over-Current	35 mA	Conversion Speed, Both Channels Converted	10V, 20mA, 100mV: 30 Times/Second RTD, Thermocouple: 7.5 Times/Second
Open Thermocouple Detect Current	50 nA	Conversion Time per Channel	10V, 20mA, 100mV: 16.7mS RTD, Thermocouple: 66.7mS
Analog Bus Isolation	500 VAC / VDC	RTD Excitation Current	250 µA

Analog Outputs		General Specifications	
Number of Channels	2	Required Power (Steady State)	TBD mA @ 24 VDC
Output Ranges	0-10 VDC, 0-20 mA	Required Power (Inrush)	TBD A for 1 ms @ 24 VDC
Nominal Resolution	14 Bits	Primary Power Range	10 - 30 VDC
Update rate	PLC dependent	Operating Temperature	0° to 60° Celsius
Minimum 10 V load	500 Ω	Storage Temperature	14 to 140°F (-10 to 60°C)
Maximum 20 mA load	500 Ω	Relative Humidity	5 to 95% Non-condensing
Maximum Error at 25°C (excluding zero)	0.1%	Filtering	15Hz hash (noise) filter 1-128 conversion digital running average filter
Maximum Error at 25°C (excluding zero)	0.1%	Terminal Type	Clamp Type, 3.5 mm Removable
Additional error for temperatures other than 25°C	0.01% / °C	Weight	11.5 oz. (326g)
Bus isolated, shares common with analog inputs		CE & UL Approvals	Review our Compliance Table

2. DIMENSIONS AND INSTALLATION
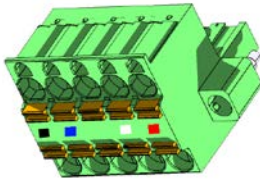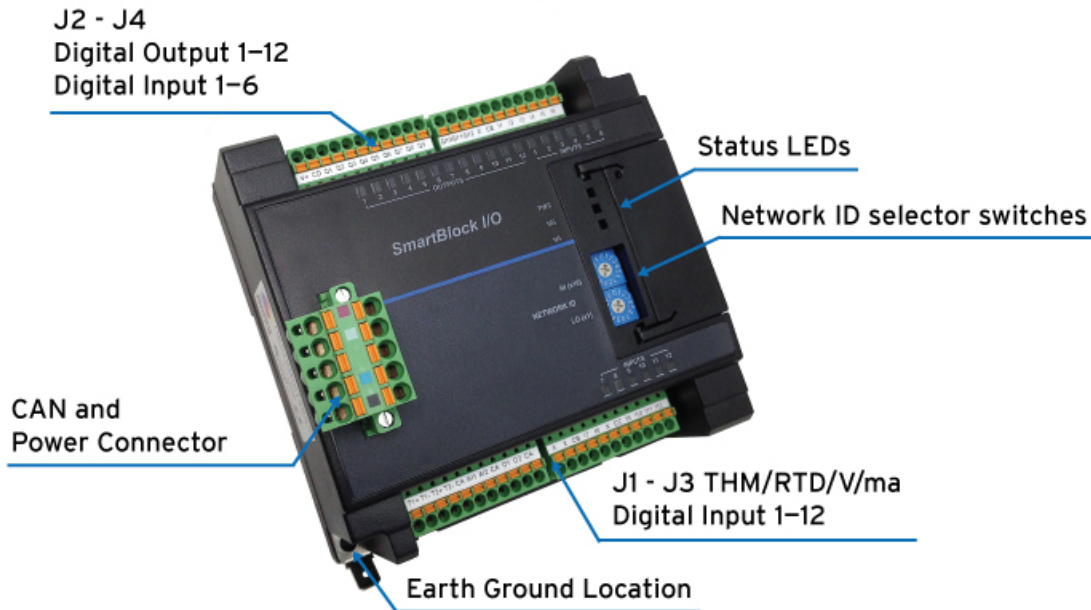
CAN Network & Power Connector
Torque rating 4.5 – 7 Lb-In (0.50 – 0.78 N-m)

| CAN Network & Power Port Pin Assignments			
Pin	**Signal**	**Signal Description**	**Direction**
1	V-	CAN and Device Ground - Black	–
2	CN_L	CAN Data Low - Blue	In/Out
3	SHLD	Shield Ground - None	–
4	CN_H	CAN Data High - White	In/Out
5	V+	Positive DC Voltage Input (10-30VDC) - Red	–

Network, Power and Grounding

A single 5 pin connector is used to make both a network connection and power input. A quality class 2 power supply should be used for this product. If the power is run with the network cable, care must be taken such that the voltage does not drop below the lower supply limit on longer runs.

A quality earth ground is required for safe and proper operation. The best ground is achieved by screwing the lower left grounding location into a grounded back plate. Alternately a ground can be connected to the spade lug. Please see Horner manual MAN0799 for details on CAN wiring.
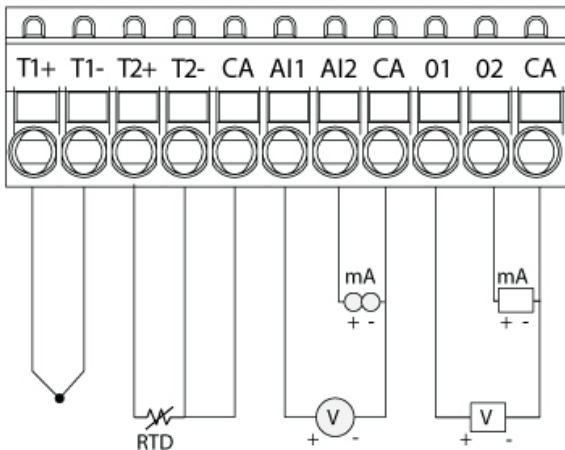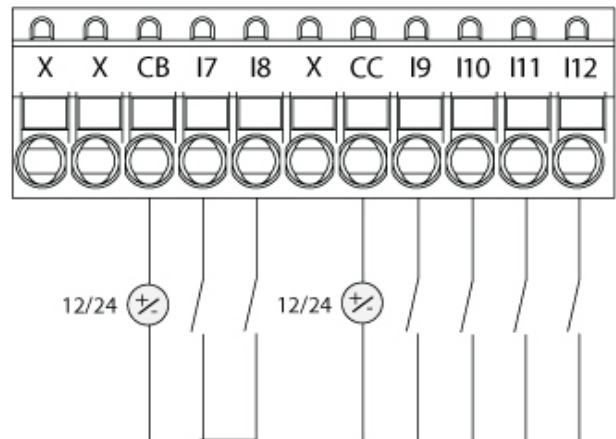
3.   WIRING
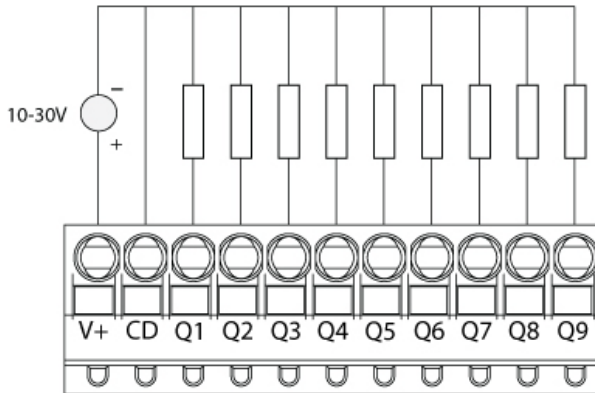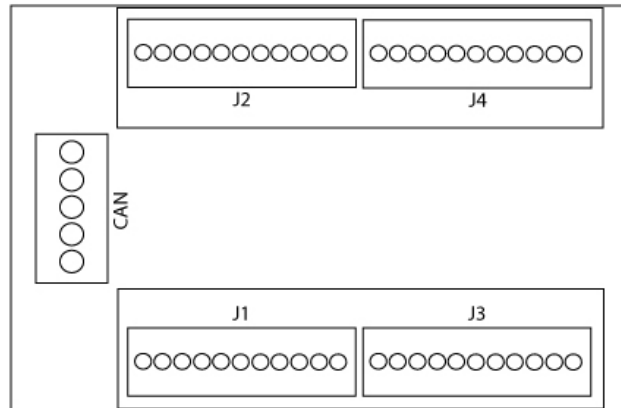
J2: V+ and CD are isolated from BUS
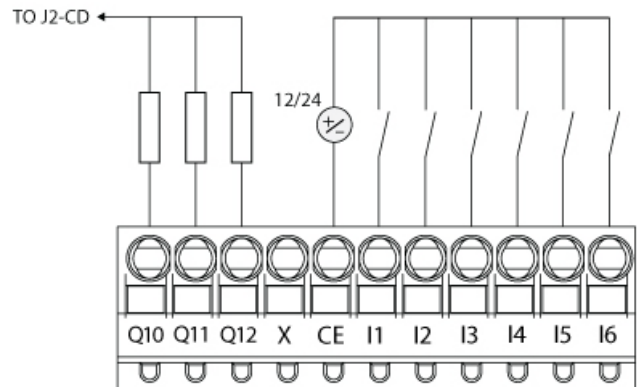
J4: X has no internal connection. CE is isolated from BUS

J1: CA terminals are internally connected together and isolated from BUS.

J3: X has no internal connection. CB and CC terminals are isolated from each other and BUS.

5. NETWORK DATA

Consumed Digital Data – This data is sent from the controller to the SmartBlock. *For typical applications the I/O configuration setup in Cscape will automatically populate this data.* For more advanced applications you may use NetPut functions to write this data. Please see the advanced programming guide MAN0880 for more details.

Bit	Description	
1-4	Analog Input 1 Type	0 = J thermocouple 1 = K thermocouple 2 = N thermocouple 3 = T thermocouple 4 = E thermocouple 5 = R thermocouple
5-8	Analog Input 2 Type	6 = S thermocouple 7 = B thermocouple 8 = C thermocouple 11 = 0 – 10 V 12 = 0-20 mA 13 = 4-20 mA 14 = ±100 mV 15 = PT100, Alpha 0.00385, DIN 43760
9	Analog Output 1 Type	0 = 10V
10	Analog Output 2 Type	1 = 20mA
12	Temperature Format	0 = 0.1°C 1 = 0.1°F
13-16	Filter	See programming Guide

Produced Analog Data – This data is sent from the SmartBlock to the controller. *Normally this data is mapped into specific registers in the I/O configuration in Cscape.* For advanced applications NetGet functions can be used to obtain this data. Since this data is broadcast to all controllers on the network additional controllers can use NetGet functions to obtain this data as well.

| Word	Function	
Word 1	INT	Analog Input 1
Word 2	INT	Analog Input 2

Consumed Analog Data – This data is sent from the controller to the SmartBlock. *Normally this data is mapped into specific registers in the I/O configuration in Cscape.* For advanced applications NetPut functions can be used to obtain this data.

Word	Function	
Word 1	INT	Analog Output 1
Word 2	INT	Analog Output 2

6. 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
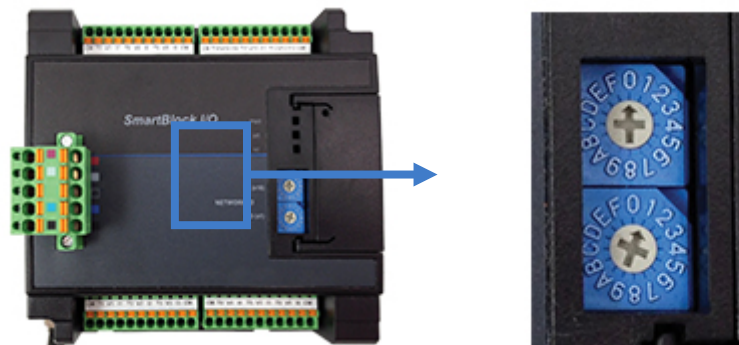
Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO		HI	LO
1	0	1	29	1	D	57	3	9	86	5	6	114	7	2	142	8	E	170	A	A	198	C	6	226	E	2
2	0	2	30	1	E	58	3	A	87	5	7	115	7	2	143	8	F	171	A	B	199	C	7	227	E	3
3	0	3	31	1	F	59	3	B	88	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

7. 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.

8. INSTALLATION / SAFETY

> **WARNING:** Remove power from the OCS controller, CAN port and any peripheral equipment connected to this local system before adding or replacing this or any module.

1) All applicable codes and standards should be followed in the installation of this product.
2) Shielded, twisted-pair wiring should be used for best performance.
3) Shields are to be terminated to frame ground.
4) In severe applications, shields should be tied directly to the ground block within the panel.
5) Ungrounded thermocouple sensors are preferred due to their isolated electrical characteristics
6) Interposing terminal strips between the sensor and the module can cause errors due to cold junction effect.
7) If interposing terminal strips must be used, use specially constructed terminal blocks, which match the material characteristics of the thermocouple sensor.
8) Horner thermocouple input modules use a high impedance differential circuit to support the use of grounded or ungrounded thermocouples. For grounded thermocouples, the specified **Common Mode Range** allows for ground potential differences between the machine ground and the PLC ground within that range. For ungrounded or floating thermocouples the high impedance inputs are subject to common mode noise pickup. For noisy environments it is recommended that one side of all ungrounded thermocouples be grounded near the PLC. This does not affect open thermocouple detection or measurement accuracy and reduces the effect of common mode noise if present. This PLC side ground connection must not be used with grounded thermocouples or accuracy will be affected. Any thermocouple should be grounded in one place at most.

When found on the product, the following symbols specify:

⚠️	**Warning:** Consult user documentation	⚡	**Warning:** Electrical Shock Hazard

> **WARNING:** To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
>
> **WARNING:** To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.
>
> **WARNING:** Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.
>
> **WARNING:** In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.
>
> **WARNING:** Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.
- Adhere to the following safety precautions whenever any type of connection is made to the module.
- Connect the green safety (earth) ground first before making any other connections.
- When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
- Make connections to the module first; then connect to the circuit to be monitored.

- Route power wires in a safe manner in accordance with good practice and local codes.
- Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
- Ensure hands, shoes and floors are dry before making any connection to a power line.
- Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

9. TECHNICAL SUPPORT

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