TC-ODD321, TK-ODD321

Table 6-28 24 VDC, 32-Point Discrete Output Module

Parameter	Specification
Number of Outputs	32 (16 points/common)
Output Voltage Range	10-31.2 VDC @ 50°C (Linear derating) 10-28 VDC @ 60°
Output Current Rating Per Point Per Module	 0.5A maximum @ 50°C (Linear derating) 0.35A maximum @ 60°C 16A maximum @ 50°C (Linear derating) 10A maximum @ 60°C
Surge Current	1A for 10ms each, repeatable every 2s @ 60C
Flash On Time	100 μsec target, 150 μsec max
On-State Current Load (Minimum)	3.0 mA per output
On-State Voltage Drop (Maximum)	1 VDC @ rated current per point (3 VDC for IEC 1131-2)
Off-State Leakage Current (Maximum)	0.5 mA per point (1 mA per point IEC 1131-2 for 0.25 A output)
Configurable Fault States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	Not protected - Fused IFM is recommended to protect outputs
Reverse Polarity Protection	None - If module is wired incorrectly, outputs may be damaged.
Output Delay Time Off to on On to off	 1.0 ms maximum 1.0 ms maximum
Power Dissipation	6.1 W
Backplane Current	See Module Power Consumption Data, page 46.
Isolation Voltage Group to group User to system	 100% tested at 2546V dc for 1s (250V ac maximum continuous voltage between groups) 100% tested at 2546V dc for 1s
Connection Terminal Blocks	TC-TBCH, 36-position terminal block

TC-HAI081, TK-HAI081

Table 6-29 HART- High Level Analog, 8-Input, Voltage/Current, and HART Module

Parameter	Specification		
Number of Points/Channels	8 single ended input channels		
Available input ranges for channels configured for non-HART. Voltage and Current Ranges:	Actual Range: ±10.25 volts 0 to 10.25 volts 0 to 5.125 volts 0 to 20.58 mA	Configuration Selection: ±10 volts 0-10 volts 0-5 volts 4-20 mA	Resolution: 16 bits (313 µV/bit) 16 bits (153 µV/bit) 16 bits (78 µV/bit) 16 bits (314 ηA/bit)
Available input ranges for channels configured for HART. Input is automatically set to Current Range only.	Actual Range: 0 to 20.58 mA	Configuration Selection: 4-20 mA	Resolution: 16 bits (314 ηA/bit)
HART Protocol Revision	Module is compliant with the specification for HART protocol Revision 5.7		
Module Publish Rate (for the analog 0-100% input value)	250 ms for all (8) channels		
Input Impedance:	(Voltage) Greater than 1.0 megΩ (Current) 249 ohms Ω nominal (internal sense resistor)		
Open Circuit Detection Typical OC Detection Time	(Voltage) – Positive Full scale reading (Current) – Negative Full scale reading Less than 5 seconds		
Normal Mode Noise Rejection: With 20 Hz. filter setting	Greater than 33 dB @ 50 Hz Greater than 60 dB @ 60 Hz		
Common Mode Rejection	Greater than 100 dB @ 50/60 Hz		
Channel Bandwidth	15.7 Hz. (-3dB) with 20 Hz. filter setting		
Calibrated Accuracy @ 25°C. Calibration interval –12 months typical.	Better than 0.05% of range (Voltage) Better than 0.15% of range (Current) including sense resistor.		
RFI Immunity	Error of less than 2.0% of range at 10 V/m, 27 to 1000 MHz		
Over voltage protection	Continuous at room temperature (both) 30 VDC (Voltage); 8 VDC (Current)		
Input Offset Drift with Temperature	<90 µV/°C (Voltage) typical. <TBD ηA/°C (Current) typical.		
Gain Drift with Temperature	15 ppm/°C (Voltage) maximum 20 ppm/°C (Current) maximum		
Module Error Over Full Temp. Range	0.1% of range (Voltage) 0.3% of range (Current)		
Module Power Dissipation	4.1 W max		
Backplane Current	See Module Power Consumption Data, page 46.		
Isolation voltage, user to system	100% tested at 2550VDC for 1second		
Connection Terminal Blocks	TC-TBCH, 36-position terminal block		
HART wiring mode supported	Point-to-Point only. Multi-drop is not supported.		

TC-HAO081, TK-HAO081

Table 6-30 HART- Analog Output, 8-Point, Current/Voltage Module

Parameter	Specification
Number of Points/Channels	8 output channels
Available output ranges for channels configured for non-HART. Voltage and Current Ranges:	Actual Range: / Configuration Selection: / Resolution: ±10.4 volts / ±10 volts / 16 bits (323 µV/bit) 0 to 10.25 volts / 0-10 volts / 15 bits (323 µV/bit) 0 to 21 mA / 4-20 mA / 15 bits (656 ηA/bit)
Available output ranges for channels configured for HART. Output is automatically set to Current Range only.	Actual Range: / Configuration Selection: / Resolution: 0 to 21 mA / 4-20 mA / 15 bits (656 ηA/bit)
HART Protocol Revision	Module is compliant with the specification for HART protocol Revision 5.7
Module scan time (for the analog 0-100% output value)	10 ms for all (8) channels
Over voltage Protection	24 VAC/VDC continuous at room temperature
Short Circuit Protection Current Voltage	Electronically current limited to 21 mA or less. Electronically current limited to 35 mA or less.
Drive Capability	>2000 Ω (Voltage) 50-750 Ω (Current) With short circuit protection for all (8) channels.
Calibrated Accuracy @ 25°C Calibration interval –	Better than 0.1% of range (Voltage) Better than 0.15% of range (Current) 12 months typical
RFI Immunity	Error of less than 2.0% of range at 10 V/m, 27 to 1000 MHz
Output Settling Time Current Output, No HART Current Output, with HART Voltage Output	 <23 ms to 95% of final value with resistive loads <35 ms to 95% of final value with resistive loads <8.5 ms to 95% of final value with resistive loads
Offset Drift with Temperature	50 µV/°C (voltage) typical. 200 nA/°C (current) typical.
Gain Drift with Temperature	20 ppm/°C (Voltage) maximum. 30 ppm/°C (Current) maximum.
Module Error Over Full Temp. Range	0.3% of range (Voltage) 0.3% of range (Current)
Isolation Voltage; User to system	100% tested at 2550VDC for 1second
Module Power Dissipation	6.3 W max
Backplane Current	See Module Power Consumption Data, page 46.
Open loop current detection Typical OC Detection Time	Current outputs only. For proper detection, the channel output value must be greater than 0.1 mA. Less than 5 seconds
Connection Terminal Blocks	TC-TBNH, 20-position terminal block
HART wiring mode supported	Point-to-Point only. Multi-drop is not supported.

6.6 Specifications – Specialty and Network Modules

TC-MDP081, TK-MDP081

Table 6-31 Pulse Input, 8 Channel Input/2 Channel Output

Parameter	Specification
Number of Inputs	8
Number of Outputs	2 (Note-1)
Input type	Floating; optically isolated
Output Type (2 output channels)	500mAmp; optically isolated
Frequency Range	0 - 100 kHz
Input Voltage	0 to 30 VDC selectable between: High Range: Counts based on input transitions at approx. 8.80 V Low Range: Counts based on input transitions at approx. 3.25V
Input Edge Selection	Each channel configured to sense an on-to-off transition based upon the leading edge or the trailing edge of the pulse
Input Voltage Hysteresis	High Range: 1.1V approx. 12.5% typical Low Range: 0.90V approx. 27% typical
Max. Input Current	12.5 mA
Typical Input Current	Low Range: 2mA High Range: 6mA
Input Channel Function Channels 0 through 5 Channels 6 and 7	 Frequency and pulse length (pulse length measurement selectable between high, low or period) Accumulated value, frequency and target values
Counter Size	32 bit
Power Dissipation	7.0 watts max
Backplane Current	See Module Power Consumption Data, page 46.
Isolation Voltage	1500Vdc terminal block to backplane 1500Vdc channel-to-channel
Connection Terminal Blocks	TC-TBCH, 36-position terminal block
Note-1: The first six channels (0-5) do not have any outputs. The Off/On outputs are associated with the last two channels (6 and 7). User sets a target value and the output transitions from OFF to ON state when the input reaches the target.	

TC-MUX021, TK-MUX021

Table 6-32 Serial Interface, User-Configurable, 2 Channel

Parameter	Specification
Module Type	Double slot-width module
Maximum Number of SI Modules per Controller	3
Number of Communication Ports	Two (2), one per Field Termination Assembly (FTA)
Physical Interface Each Port	EIA RS-232D (DB-25) or EIA RS-422/485D (5-terminal compression connection), selectable per FTA
Maximum Communication Speed	19.2 kb/s per FTA
Supported FTA Models	MU-TSIM12, Modbus MU-TSIA12, Allen-Bradley DF1
Power Dissipation	10 watts
Backplane Current	See Module Power Consumption Data, page 46.
Vibration & Shock	10 to 50 Hz, 5 g, 30 g peak, 11 ms duration (operating)
Electro-static Discharge	2 kV to 15 kV anywhere on case, 10 kV on RS port lines
Noise	10 v/meter, 20 MHz to 100 MHz
Dielectric withstand	500 v to ground
Module Connection	TC-KSM003, Power Adapter Cable

(cont'd)

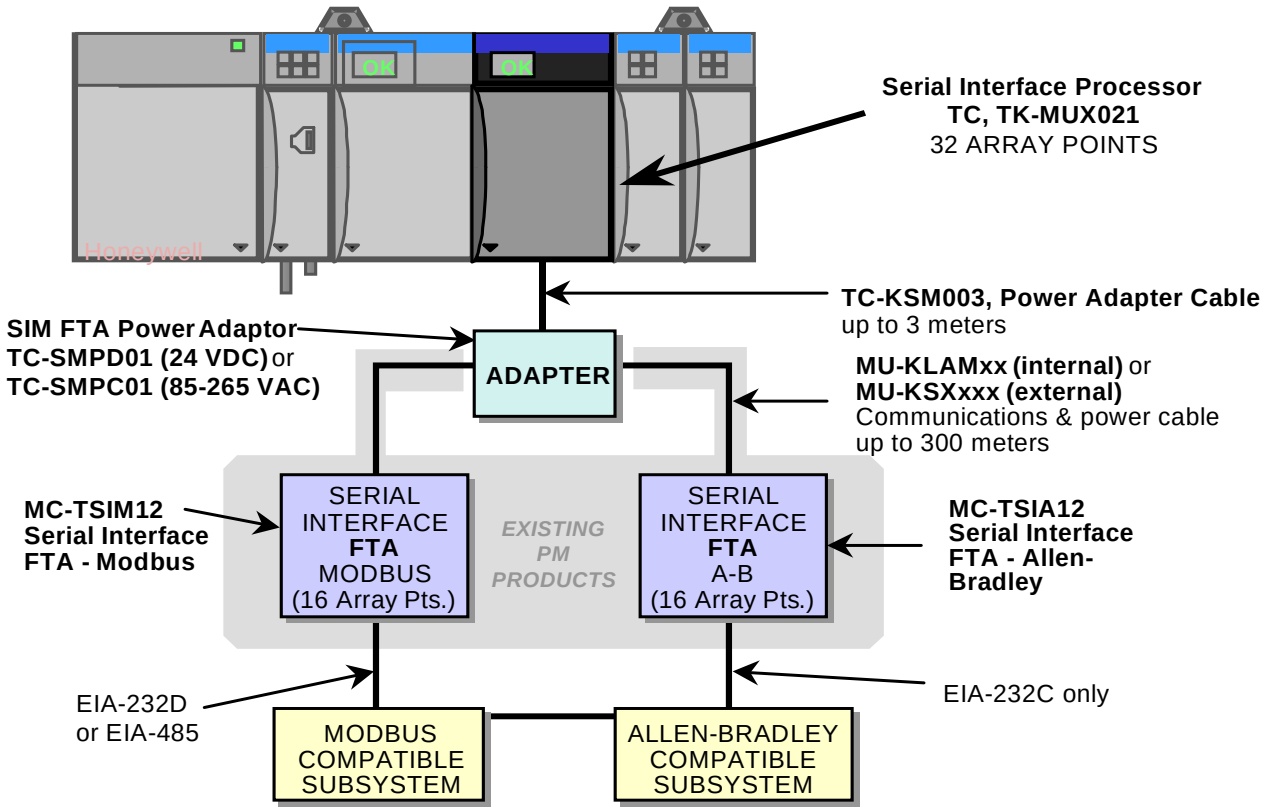

Figure 6-1 Serial Interface Processor Shown With Full Two-FTA Configuration

TC, TK-MUX021 - Serial Interface, User-Configurable, 2 Channel

The Experion **Serial Interface Module** (SIM), TC-MUX021, enables bi-directional, serial-protocol communications between the Experion Control Processor and qualified third-party devices. The following models are required to configure a Serial Interface connection (note choices of Power Adapters, cables, and FTAs):

Model Number	Description
TC-MUX021	Serial Interface, 2 Channel
TC-KSM003	SIM-to-Power Adapter Cable (3 meters)
TC-SMPD01	SIM FTA Power Adapter 24 VDC *or*
TC-SMPC01	SIM FTA Power Adapter 85-265 VAC
MU-KLAMxx	Internal Cabinet Cable (Part # 51304465-xxx) *or*
MU-KSXxxx	External Cabinet Cable (Part # 51191673-xxx)
MC-TSIM12	Modbus FTA (Conformally Coated) *or*
MC-TSIA12	Allen-Bradley DF1 FTA (Conformally Coated) *or*
n/a	Custom protocol -- contact your Honeywell representative

The following are available options for MU-KLAMxx and MU-KSXxxx cables:

Model Number	Cable Description	Part Number
MU-KLAM01	Internal Cabinet Cable, 33 cm	51304465-100
MU-KLAM02	Internal Cabinet Cable, 66 cm	51304465-200
MU-KLAM03	Internal Cabinet Cable, 100 cm	51304465-300
MU-KLAM06	Internal Cabinet Cable, 200 cm	51304465-400
MU-KLAM09	Internal Cabinet Cable, 300 cm	51304465-500
MU-KSX030	External Cable, 30 m (100 ft.)	51191673-030
MU-KSX152	External Cable, 152 m (500 ft.)	51191673-152
MU-KSX305	External Cable, 305 m (1000 ft.)	51191673-305

The SIM uses Field Termination Assembly (FTA) and protocols developed for the APM/HPM product line (see next two pages). MU-TSIM12, Modbus FTA, supports standard Modbus RTU RS-232 or RS422/485 communications. MU-TSIA12, Allen-Bradley FTA, supports A-B DF1 serial protocol over Rs232 only.

Note that protocols developed under the PM/APM/HPM Serial Device Interface protocol or the Smart Transmitter Interface (STI) protocols are not supported.

MU-TSIM12 and MU-TSIA12 use industry standards to support many industrial devices. Contact your Honeywell representative for support of non-standard protocols.

MC-TSIM12

Table 6-33 Serial Interface FTA - Modbus

	Specification
Physical Interface	EIA-232D or EIA-485D
Devices Supported	Multivendor Qualified Modbus Compatible Devices
Distance--Power Adapter to FTA	Internal cable within cabinet or External cable 300 m (1000 ft.) maximum
Power Dissipation	1.4 watts max
Surge withstand capability	IEEE SWC 472-1974
ESD Protection	IEC 801.2
Number of Devices per SI IOM	2 FTAs per SI IOM Up to 15 devices per FTA
Data Quantity per IOM	16 Points per serial channel (organized as Arrays) Each point can access *one* of the following: • 512 Booleans into FLAGS • 16 Reals or 32 Integers into NUMERICS • 64 NUMERICS (Diagnostic Counter Data Only) • 1 STRING of 64 Characters • 2 STRINGS of 32 Characters • 4 STRINGS of 16 Characters • 8 STRINGS of 8 Characters
Serial Data Format	8 data bits with programmable 9th bit
EIA RS232-D Support Transmission Mode: Lines Supported: Distance--FTA to Device:	 Serial asynchronous, bidirectional TXD, RXD, RTS, CTS, DSR, DTR, Logic GND, Protective GND 15 m (2500 pf cable capacity maximum)
EIA RS485D Support Transmission Mode: Lines Supported: Common Mode Operation: Number of drops: Distance--FTA to Device:	 Serial asynchronous, bidirectional, half duplex only Two wire, differential pair: DATA+, DATA-, Protective GND (shield) 250 Vac rms (continuous) 15 drops maximum 1.2 km (4000 ft.) maximum
Modbus Interface Specification Protocol: Serial Line Mode: Selectable Baud Rates: Selectable Parity: Number of Stop Bits: Modem Control Support: Keep Alive Cell Write Message Response Timeout: Exception Errors Reported: Data Formats Supported: Intermessage stall time: Function Codes Supported:	(Default parameters are shown in **bold**.) Modbus, Remote Terminal Unit (RTU) **RS232D** or RS485D 1200, 2400, 4800, 9600, **19200** bps None, **odd**, or even 1 Selectable ON/**OFF** Configurable address/**NONE** Configurable timeout/**1.5 seconds** All Boolean, Real, ASCII Strings, Signed Integers 3.5 character time minimum 01, 02, 03, 04, 05, 06, 08, 16

MC-TSIA12

Table 6-34 Serial Interface FTA - Allen-Bradley

General	
Interface Type:	EIA-RS232-D
Number of Channels per IOP:	2
Distance -- Power Adapter to FTA:	300 m
Baud Rate:	19.2 k bps
Serial Data Format with parity bit:	8 data bits
Common Mode Operation:	250 V rms (continuous)
ESD Protection:	IEEE SWC 472-1974
Power Dissipation:	1.4 watts max
EIA-RS232-D Support	
Interface Type:	Serial asynchronous
Lines Supported:	TXD, RXD, Logic GND, Protective GND (Compatible with CCIT V.24; CCIT V.28)
Distance -- FTA to Device:	15 meters (cable cap. = 2500 pf max.)
SI A-B Specific Interface Specifications	
Protocol:	Full Duplex Allen-Bradley DF1 with embedded responses
Transmission Mode:	Character oriented
Serial Line Mode:	RS232D
Parity:	even
No. Stop Bits:	1
Modem Control Support:	Off
ACK Timeout:	3.2 sec.
FTA Message Response Timeout:	4.0 sec.
Data Formats Supported:	Booleans, Reals, Signed/Unsigned Integers, ASCII Strings
CIM Communication Options:	Pass-through diagnostic requests Ignore handshaking Accept duplicate message BCC error check
Allen-Bradley Family Types Supported:	PLC-2 PLC-3 (Native Mode and PLC-2 Mode) PLC-5, except PLC-5/250 (Native Mode and PLC-2 Mode)

Table 6-35 Allen-Bradley File Types

Array Point Types	PLC-5 File Types	PLC-3 Files Types
Flag	Output (O), Input (I), Status (S)	Output (O), Input (I), Status (S)
Flag	Bit (B)	Binary (B)
Numeric (16-bit Signed Integer)	Integer (N)	Integer (N)
Numeric (IEEE Single Precision)	Float (F) (IEEE Format)	
Numeric (16-bit Unsigned Integer)	Timer (T), Counter (C) (READ ONLY)	
String	ASCII (A)	ASCII (A)

7. Reference

7.1 Module Power Consumption Data

Data for individual module current consumption is provided below as a reference. For each chassis, the total current draw limit cannot be exceeded on each current bus.

Model Number	current draw @ 24vdc (amps)	current draw @ 5vdc (amps)	current draw @ 3.3vdc (amps)	current draw @ 1.2vdc (amps)
Power Supply (limit)	2.8	10.0	4.0	1.5
All Chassis	0.010		0.055	
Controllers				
TC-PNX021	0.005	1.500	1.000	0.007
TC/ TK-PRS021	0.005	1.600	1.300	0.007
ControlNet				
TC-CCN011	0.002	0.970		
TC-CCN012	0.002	0.970		
TC-CCR011	0.002	1.000		
TC/ TK-CCR012	0.002	1.000		
Redundancy				
TC-, TK-PRR021	0.090	1.000	0.750	0.007
Battery Extension				
TC, TK-PPD011	0.036	0.112		
Analog				
TC, TK-IAH061	0.100	0.250		0.005
TC, TK-OAH061	0.300	0.250		0.005
TC, TK-OAV061	0.175	0.250		0.005
TC, TK-IXL061	0.125	0.250		0.005
TC, TK-IXL062	TBD	TBD		TBD
TC, TK-IXR061	0.125	0.250		0.005
TC, TK-IAH161	0.060	0.200		0.005
TC, TK-HAI081	0.060	0.350		0.005
TC, TK-OAV081	0.280	0.200		0.005
TC, TK-HAO081	0.230	0.200		0.005
TC, TK-MDP081	0.002	0.500		0.004
Isolated Discrete Relay				
TC, TK-ORC081	0.100	0.100		
TC, TK-ORC161	0.150	0.150		
AC Input				
TC, TK-IDK161	0.003	0.125		
TC, TK-IDW161	0.002	0.100		
TC, TK-IDX081	0.002	0.100		
TC, TK-IDA161	0.002	0.100		