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## Intrinsically Safe Temperature Concentrator System



- Up to 32 Channels per Network
- HART and PC configurable
- 2, 3 & 4-wire RTD or Thermocouple
- Transmitter like Sensor Diagnostics and performance, RTD  $\pm 0.1^{\circ}\text{C}$  Accuracy
- Two communication modes; HART or MODBUS RTU (RS485)



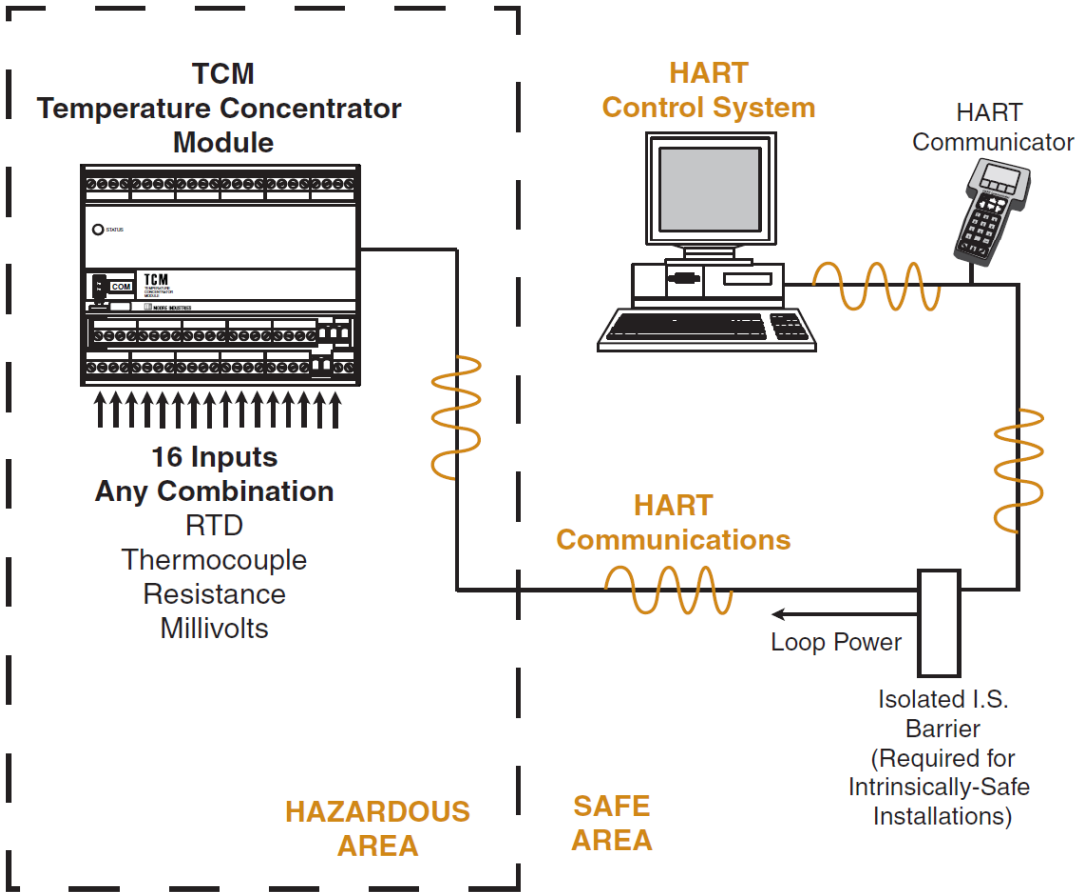
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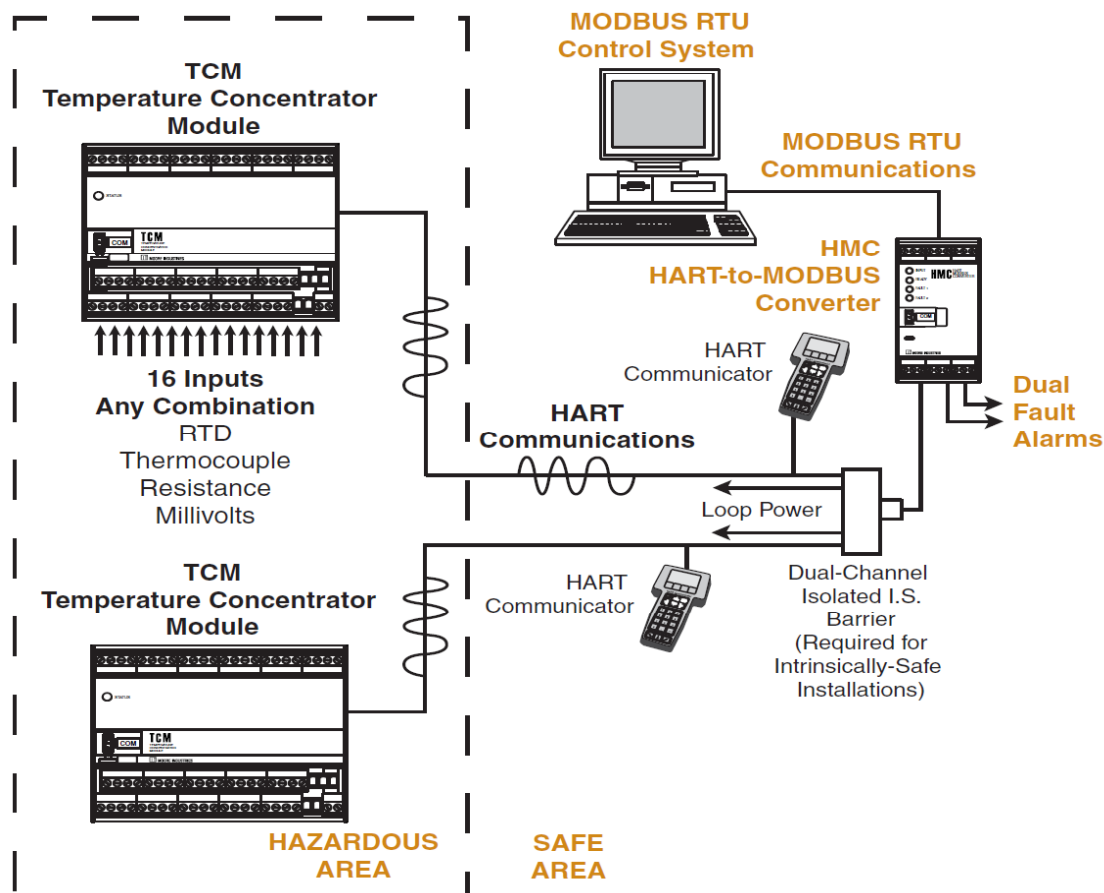
# HART Communications Mode



- 16 Channels
- TCM module is loop powered by I.S Barrier
- Each TCM channel is a HART slave, each channel has a unique HART address (0-15)
- Host system acts as HART master
- Each HART channel has to be individually polled by HART master

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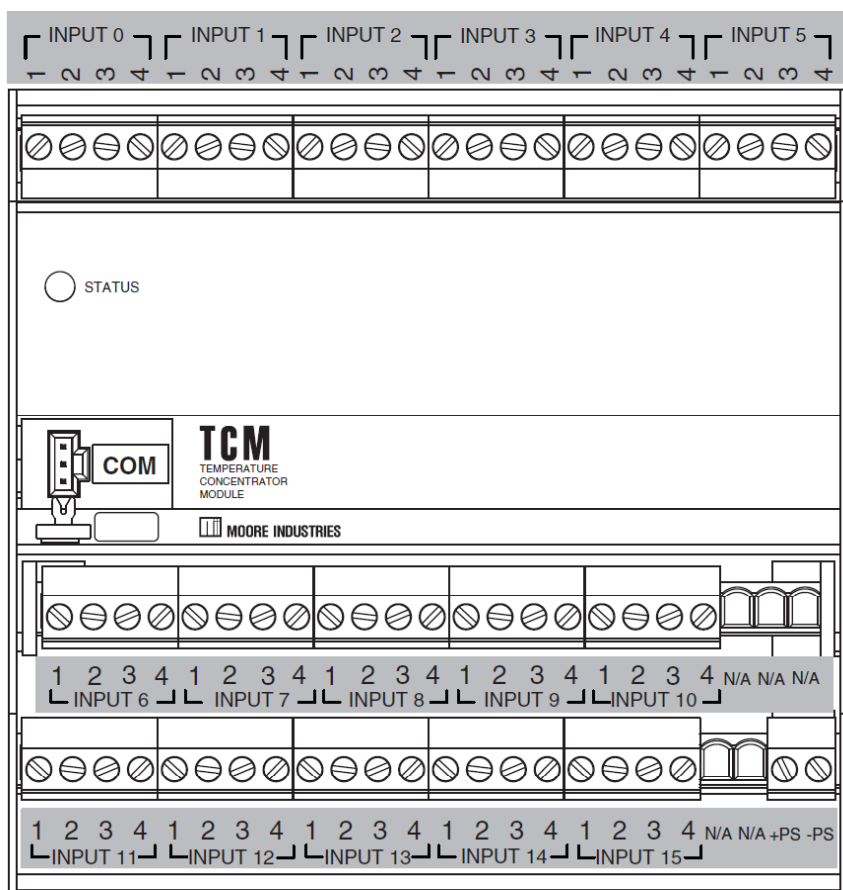
## MODBUS Communications Mode



- 16 or 32 Channels
- TCM modules are loop powered by I.S Barrier
- Each TCM acts as a HART slave with 16 channels
- HMC acts as HART primary master
- Each TCM provides 16ch data in single HART response every 500ms
- HMC converts HART data to serial MODBUS RTU (RS485)

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## TCM: Temperature Concentrator Module



- 16 Channels
- RTD, ohms, potentiometer, T/C and mV Inputs
- Configure Inputs with HART Hand-Held communicator or free PC software
- Loop-powered from I.S Barrier, HART based host system or HMC module
- Installs in Hazardous Area; Zone 0 Exia (Class 1 Div 1), or Zone 2 Type N (Class 1 Div 2)



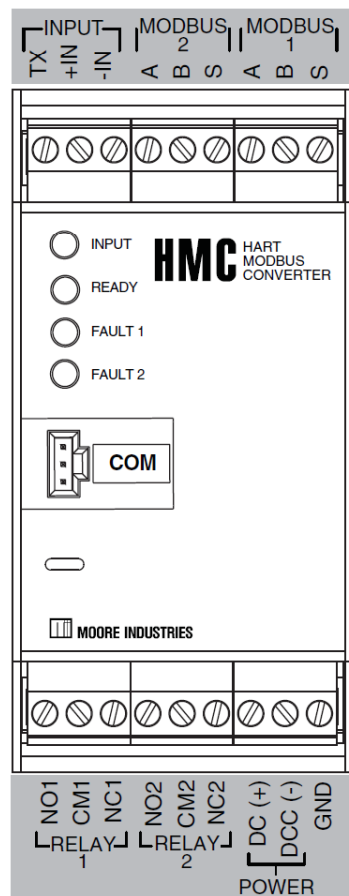
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## HMC: HART to Modbus Converter



- Can supply power to one or two TCM's
- Acts as HART primary master
- Programs with PC software
- Two Fault Alarms: one for each TCM, alarm on loss of HART comms or sensor input
- Dual MODBUS RTU (RS485) comms
- Installs in Safe Area



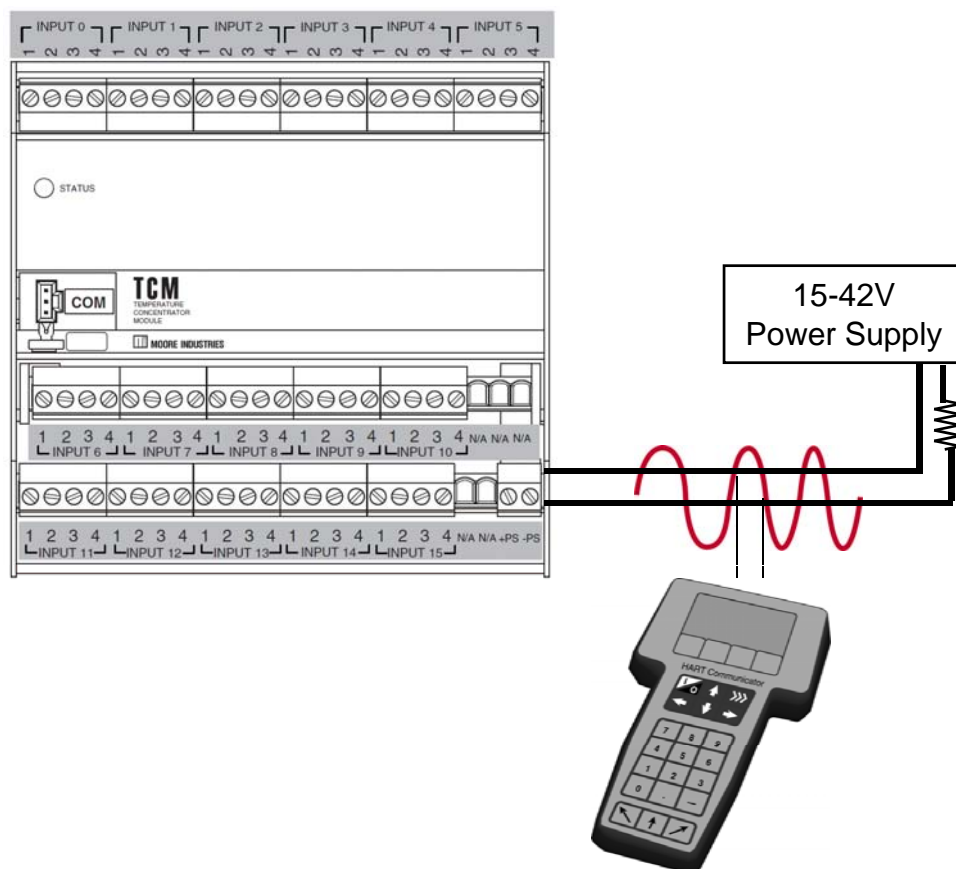
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## TCM Setup Using HART Hand Held Communicator

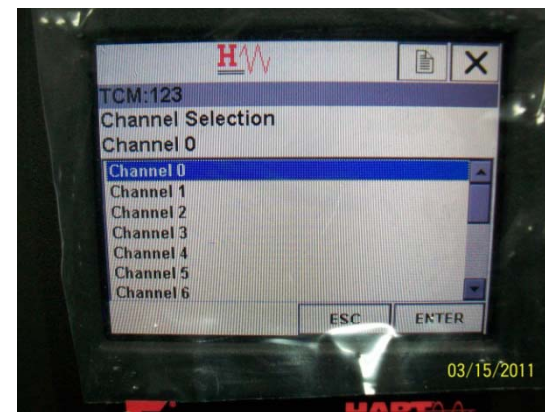
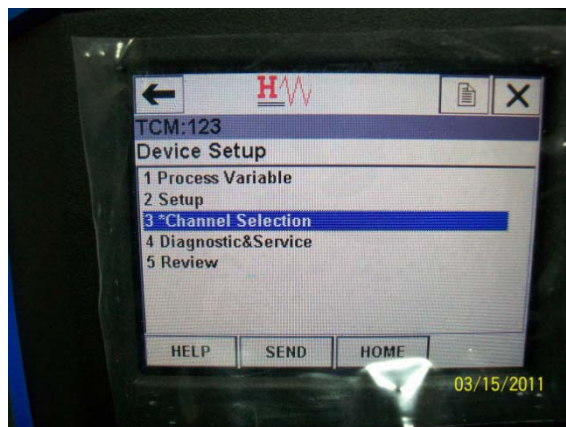
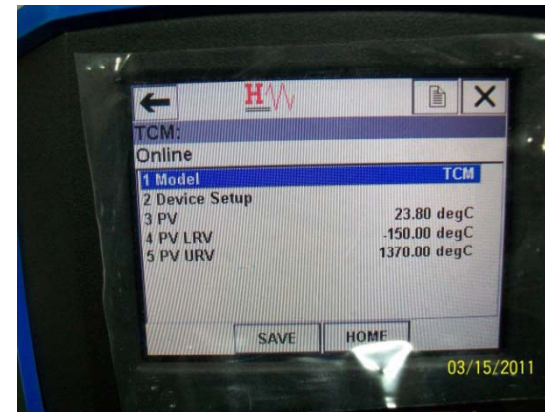


- HART HHC/Modem connects anywhere on the HART loop (downstream of HMC)
- HART based HOST system (AMS) can also configure and communicate with TCM
- Configure Sensor Type, Range, Eng Units, Tag, etc.
- Fault status with HHC: Sensor wire broken, Out of range error, perform self test, etc.
- Calibrate with HHC: Input Capture & Sensor Trimming
- Perform maintenance in Hazardous Areas



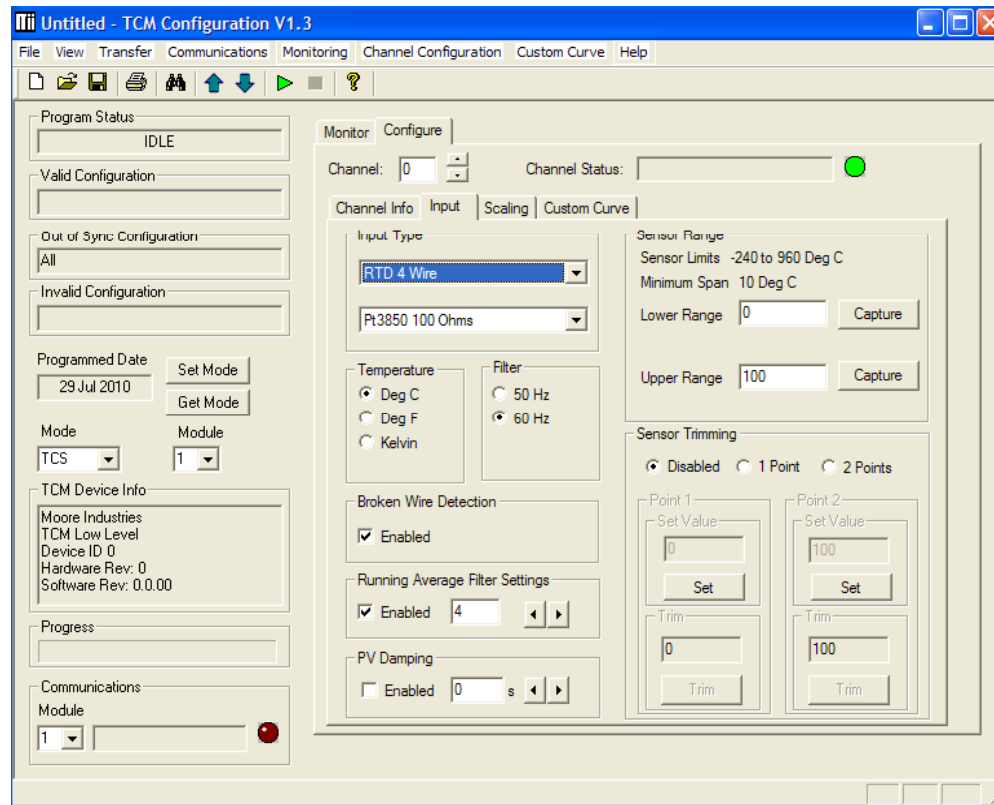
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## TCM Setup Using HART Hand Held Communicator



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## TCM Setup Using PC Software



- Free PC software supplied
- Simple intuitive programming
- Front panel connection via Serial or USB cable
- Configure Sensor Type, Range, Eng units, Tag, etc.
- Calibration functions: Input Capture & Sensor Trimming



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## HMC Setup Using PC Software

HART | Alarms | MODBUS

Number of Retries:  ☒ TCM 1 Enabled ☐ TCM 2 Enabled

TCM 1 | TCM 2

|      |                 |       |                 |
|------|-----------------|-------|-----------------|
| Ch 0 | 0.234           | Ch 8  | Input Saturated |
| Ch 1 | 30.889          | Ch 9  | Input Saturated |
| Ch 2 | 0.700           | Ch 10 | Input Saturated |
| Ch 3 | 79.191          | Ch 11 | Input Saturated |
| Ch 4 | 260.704         | Ch 12 | Input Saturated |
| Ch 5 | Input Saturated | Ch 13 | Input Saturated |
| Ch 6 | Input Saturated | Ch 14 | Input Saturated |
| Ch 7 | Input Saturated | Ch 15 | Input Saturated |

- Monitor TCM 1 / TCM 2:  
Displays the PV & Channel Status of each connected TCM
- Number of Retries can be set between 1-9 which determines how many times the HMC attempts to communicate with the TMC (without success) before triggering HMC Fault Alarm
- Fault Alarm is non-latching



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## HMC Setup Using PC Software

The screenshot displays two windows from the HMC Setup PC Software. The top window is the 'Alarms' tab, showing settings for TCM 1 and TCM 2. TCM 1 has 'No HART', 'Hardware Error', and 'Bad Configuration' checked, with a delay of 3 seconds and 'Fail Safe' enabled. TCM 2 has 'No HART', 'Hardware Error', and 'Bad Configuration' checked, with a delay of 0 seconds and 'Fail Safe' disabled. The bottom window is the 'MODBUS' tab, showing 'Communications' settings: MODBUS Address (Dec) is 1, Baud Rate is 9600, Parity is None, Floating Point Word Order is Standard LSW, and Failed TCM's Register Value is Hold Last.

**Alarms Tab:**

- TCM 1 Alarm:**
  - ☒ No HART
  - ☐ Broken Wire
  - ☒ Hardware Error
  - ☒ Bad Configuration
  - ☐ Input Saturated
  - ☐ Input Out of Table Range
  - Delay (s):
  - ☒ Fail Safe
- TCM 2 Alarm:**
  - ☒ No HART
  - ☐ Broken Wire
  - ☒ Hardware Error
  - ☒ Bad Configuration
  - ☐ Input Saturated
  - ☐ Input Out of Table Range
  - Delay (s):
  - ☐ Fail Safe

**MODBUS Tab:**

- Communications:**
  - MODBUS Address (Dec):
  - Baud Rate:
  - Parity:
- Floating Point Word Order:**
  - ☒ Standard LSW
  - ☐ Swapped MSW
- Failed TCM's Register Value:**
  - ☒ Hold Last
  - ☐ Preset to:
  - ☐ Set to NaN

- Fault Alarms: two SPDT 2A, 250Vac non-inductive relays
- Alarms can be set for loss of HART comm, sensor failures, config errors, hardware errors and PV out of range
- Alarms are non-latching and can be set for Fail Safe or Non Fail Safe
- MODBUS RTU settings:
  - Address
  - Baud Rate
  - Parity
  - Float word order
  - PV register values on loss of communication with TCM



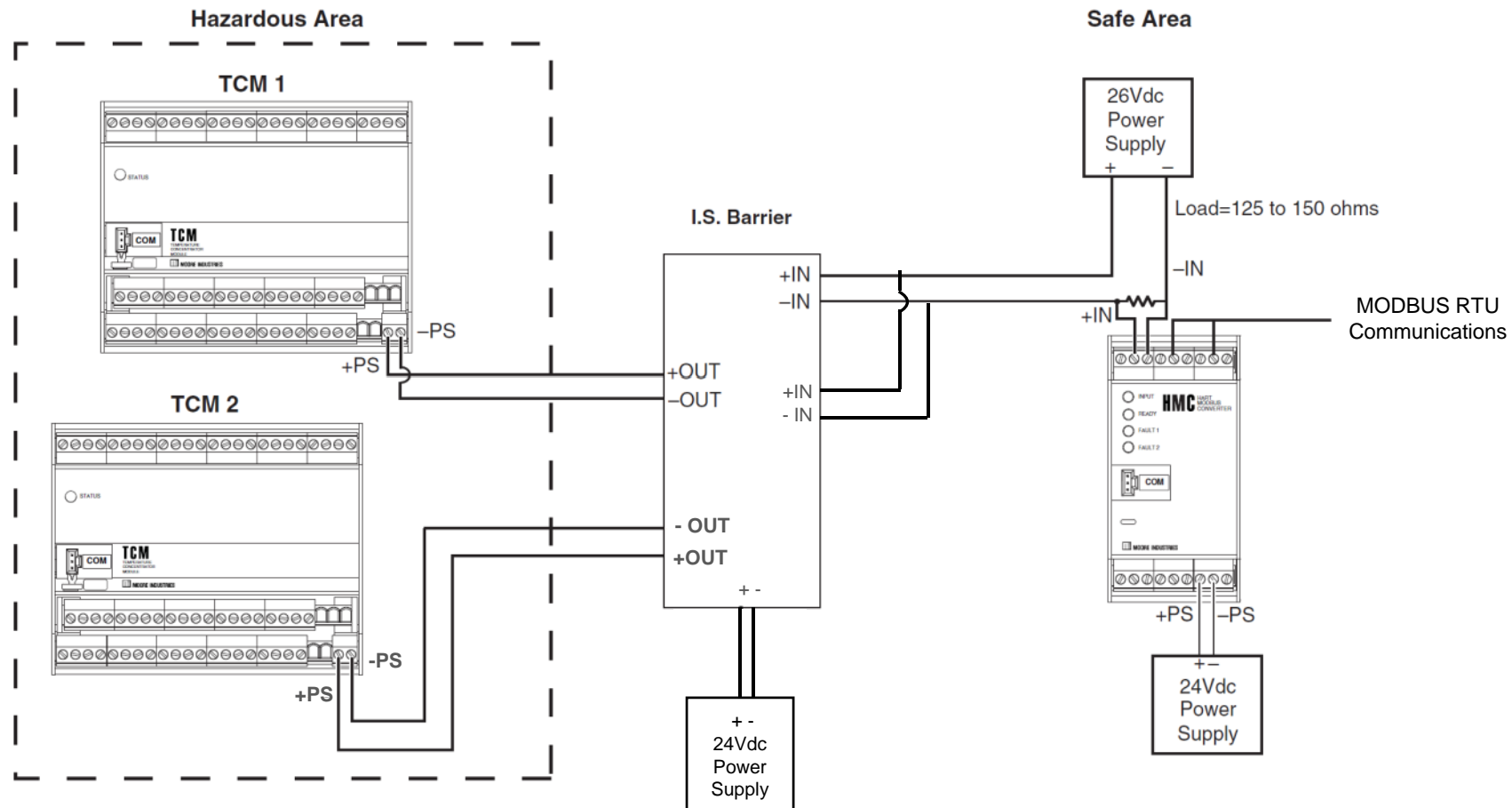
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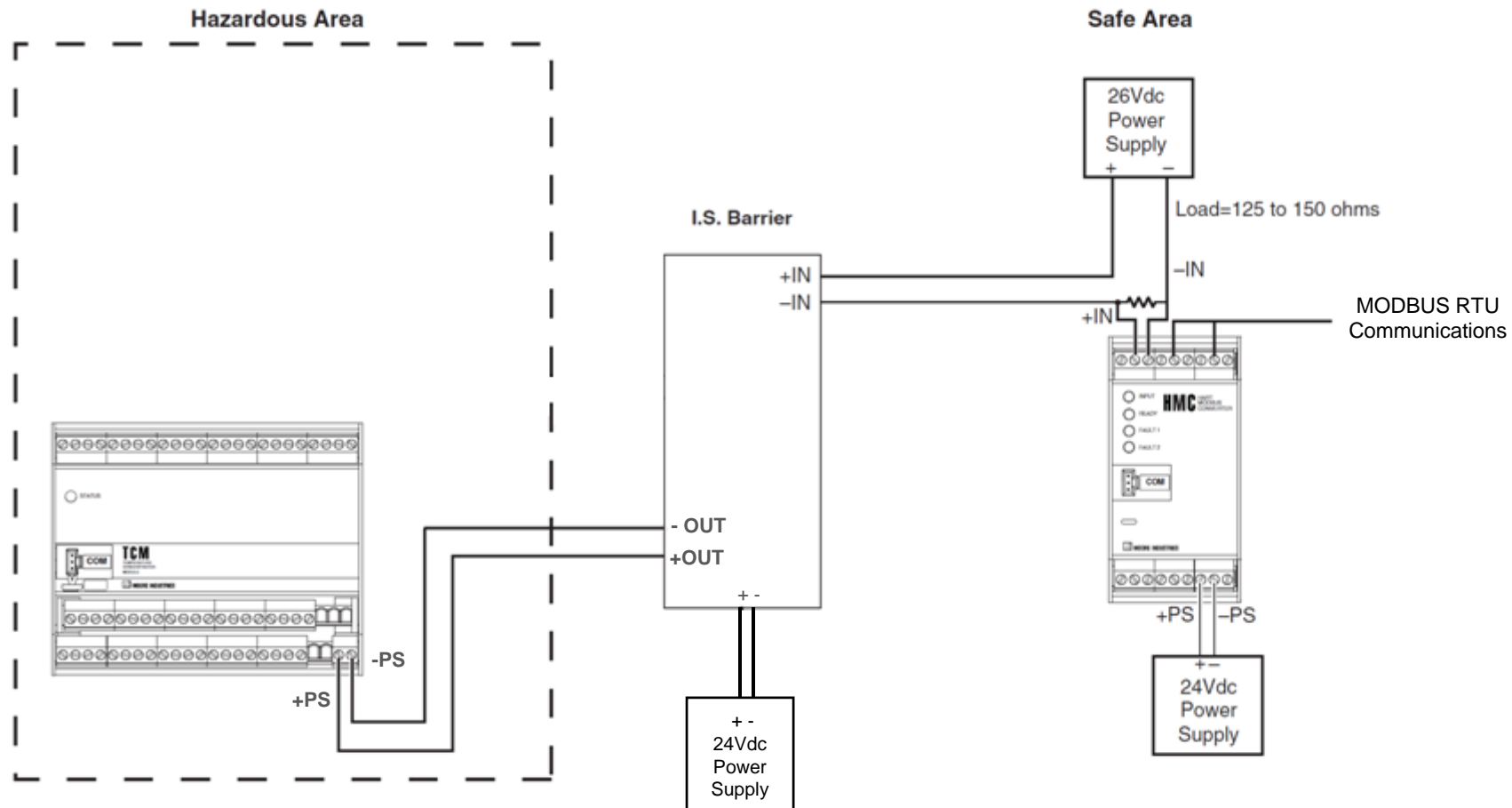
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## TCS Intrinsically Safe Wiring – Dual Channel Barrier



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## TCS Intrinsically Safe Wiring – Single Channel Barrier



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## Intrinsically Safe Temperature Concentrator System



- Transmitter Like performance with; 20 bit input resolution & 5 year stability specification
- Eliminates the need for dedicated transmitters or expensive cable installations
- 500Vrms Input to Output Isolation
- Robust design allows -45 to +85°C operation
- Enclosures available for field mounting



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