
2.2.3 VitalSensors VS-300 Sensor Management Station Remote/Relay Guide

Implementing Remote-IN/Relay-OUT Digital I/O Fieldbus

Objective:

- Become familiar with the instrument wiring requirements for the VS-300 Remote-IN/Relay-OUT Field Wiring
 - Become familiar with PLC signal requirements necessary for the VS-300 SMS to make automatic product/brand changes and line status.
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Equipment:

- 3000 Sensor System w/VS-300 Sensor Management Station
 - PLC and field wiring supplies
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While every effort was made to verify the following information, no warranty of accuracy or usability is expressed or implied.



Please Note: Electrical wiring and installation must only be performed by a qualified electrician. Proper Lock Out / Tag Out procedures must be observed!

Overview: Sensor Management Station Remote/Relay Functions:

The VS-300 Sensor Management Station can be equipped with Remote-IN / Relay-OUT digital I/O connection. Through control wiring, the following SMS functions can be executed:

- Brand / Recipe change (to VS-300 SMS)
- Line Stop / Flow signal (to VS-300 SMS)
- Process Alarms (to PLC)
- Hardware Fault Alarm (to PLC)

Wiring Information:

- Cable 17-20 Conductor Shielded Cable, 6-8mm diameter
 - o Provided by end-user
- Connector (included) Female, 19-pin, Turck, p/n K 19-0
 - o Provided by VitalSensors
- Fieldbus Port Male 19-pin, on bottom of VS-300 SMS
 - o Pre-installed
- Isolated Digital Inputs 8 required
 - o Voltage Range: 3 to 31 VAC or VDC (40 to 10000 Hz)
- Isolated Digital Outputs 8 required
 - o Solid State FETs (off @power up), Voltage Range 5-35 VDC for continuous use

Input Wiring (PLC to VS-300 SMS)

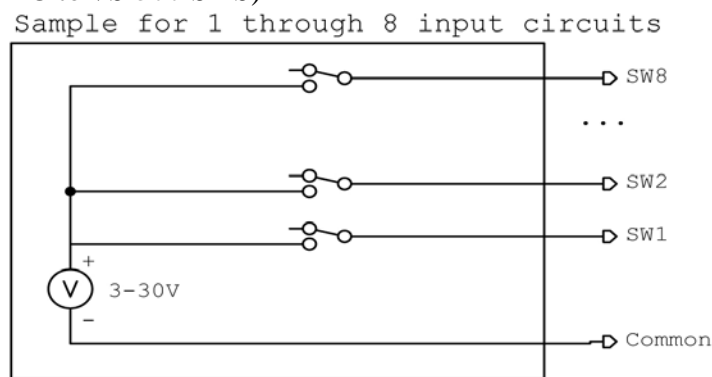


Fig. 1

- Figure 1 shows how the “switches” must be connected (SW1 - SW8)
- PLC supplies the switching voltage and the switching logic
 - o Using HIGH (voltage) or LOW (ground).
- 6 switches are used to provide for 64 products/recipes
 - o SW3 - SW8

Output Wiring (VS-300 SMS to PLC)

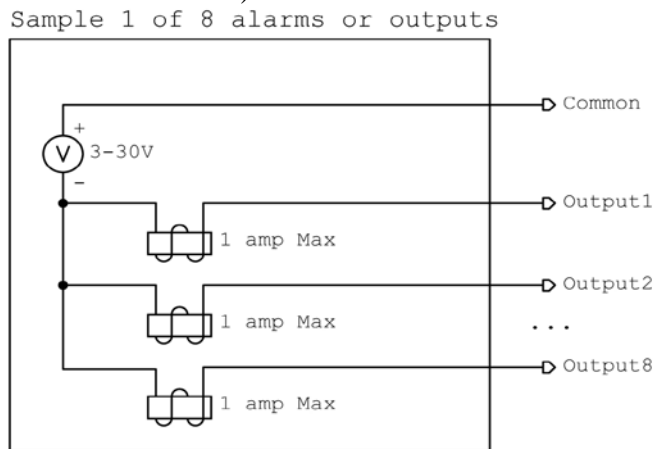


Fig. 2

- Figure 2 shows the wiring for the output circuit
- Independent circuit is required for each of the output signals
- PLC supplies voltage
- VS-300 SMS provides “contact” closure for output
 - o 1 amp MAX

Connector Information:

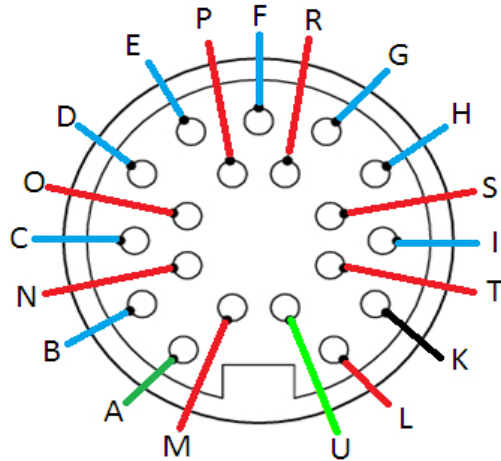


Fig. 3

- Figure 3 shows the inside of the Turck BK-19 connector
 - o Solder cup side
- End-user solders the cable into this connector to the cable
 - o Cable is customer-supplied

Connections:

| PIN | CONNECTION |
|-----|--|
| A | Input Common (Ground) |
| B | Sw0 Bit 0 B ← Enable (Low) / Disable (High) Reading |
| C | Sw1 Bit 1 B ← Line Stop / No Flow = (High) Production / FLOW = (Low) |
| D | Sw2 Bit 2 B |
| E | Sw3 Bit 3 B |
| F | Sw4 Bit 4 B |
| G | Sw5 Bit 5 B |
| H | Sw6 Bit 6 B |
| I | Sw7 Bit 7 B |
| K | Output Common ← +3 to 30V |
| L | Output 1 Bit 7 |
| M | Output 2 Bit 6 |
| N | Output 3 Bit 5 |
| O | Output 4 Bit 4 |
| P | Output 5 Bit 3 |
| R | Output 6 Bit 2 |
| S | Output 7 Bit 1 |
| T | Output 8 Bit 0 |
| U | Spare Ground |

PLC Logic - Remote-IN (PLC to VS-300 SMS):

The VS-300 Sensor Management Station can received brand-change signals from a PLC

- 8 “switches” support up 64 different brands / recipes
- Combinations of HIGH / LOW PLC signals correspond to particular brands / recipes
- The HIGH / LOW signals for selecting brands / recipes are in *Figure 4*

| Brand # | Sw0 | Sw1 | Sw2 | Sw3 | Sw4 | Sw5 | Sw6 | Sw7 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | low | low | low | low | low | low | low | Low |
| 1 | low | low | H | low | low | low | low | low |
| 2 | low | low | low | H | low | low | low | low |
| 3 | low | low | H | H | low | low | low | low |
| 4 | low | low | low | low | H | low | low | low |
| 5 | low | low | H | low | H | low | low | low |
| 6 | low | low | low | H | H | low | low | low |
| 7 | low | low | H | H | H | low | low | low |
| 8 | low | low | low | low | low | H | low | low |
| 9 | low | low | H | low | low | H | low | low |
| 10 | low | low | low | H | low | H | low | low |
| 11 | low | low | H | H | low | H | low | low |
| 12 | low | low | low | low | H | H | low | low |
| 13 | low | low | H | low | H | H | low | low |
| 14 | low | low | low | H | H | H | low | low |
| 15 | low | low | H | H | H | H | low | low |
| 16 | low | low | low | low | low | low | H | low |
| 17 | low | low | H | low | low | low | H | low |
| 18 | low | low | low | H | low | low | H | low |
| 19 | low | low | H | H | low | low | H | low |
| 20 | low | low | low | low | H | low | H | low |
| 21 | low | low | H | low | H | low | H | low |
| 22 | low | low | low | H | H | low | H | low |
| 23 | low | low | H | H | H | low | H | low |
| 24 | low | low | low | low | low | H | H | low |
| 25 | low | low | H | low | low | H | H | low |
| 26 | low | low | low | H | low | H | H | low |
| 27 | low | low | H | H | low | H | H | low |
| 28 | low | low | low | low | H | H | H | low |

| | | | | | | | | |
|------|-----|-----|------------------------|-----|-----|-----|-----|-----|
| 29 | low | low | H | low | H | H | H | low |
| 30 | low | low | low | H | H | H | H | low |
| 31 | low | low | H | H | H | H | H | low |
| 32 | low | low | low | low | low | low | low | H |
| 33 | low | low | H | low | low | low | low | H |
| 34 | low | low | low | H | low | low | low | H |
| 35 | low | low | H | H | low | low | low | H |
| 36 | low | low | low | low | H | low | low | H |
| 37 | low | low | H | low | H | low | low | H |
| 38 | low | low | low | H | H | low | low | H |
| 39 | low | low | H | H | H | low | low | H |
| 40 | low | low | low | low | low | H | low | H |
| 41 | low | low | H | low | low | H | low | H |
| 42 | low | low | low | H | low | H | low | H |
| 43 | low | low | H | H | low | H | low | H |
| 44 | low | low | low | low | H | H | low | H |
| 45 | low | low | H | low | H | H | low | H |
| 46 | low | low | | H | H | H | low | H |
| 47 | low | low | H | H | H | H | low | H |
| 48 | low | low | low | low | low | low | H | H |
| 49 | low | low | H | low | low | low | H | H |
| 50 | low | low | low | H | low | low | H | H |
| 51 | low | low | H | H | low | low | H | H |
| 52 | low | low | low | low | H | low | H | H |
| 53 | low | low | H | low | H | low | H | H |
| 54 | low | low | | H | H | low | H | H |
| 55 | low | low | H | H | H | low | H | H |
| 56 | low | low | low | low | low | H | H | H |
| 57 | low | low | H | low | low | H | H | H |
| 58 | low | low | low | H | low | H | H | H |
| 59 | low | low | H | H | low | H | H | H |
| 60 | low | low | low | low | H | H | H | H |
| 61 | low | low | H | low | H | H | H | H |
| 62 | low | low | low | H | H | H | H | H |
| 63 | low | low | H | H | H | H | H | H |
| HOLD | low | H | <i>Any Value Valid</i> | | | | | |

Fig. 4

Explanation of “Switch” functionality:

NOTE: The *VS-300 SMS* requires continuous signals from the PLC. For example, if Brand 1 is to be produced for 3 hours, then the relevant signals must be send for the duration of the production run.

Sw0 = Master SEND signal

- If Sw0 = LOW, the *SMS* will read the input signals sent from the PLC to Sw1 – Sw7
 - o Sw0 = **LOW during normal operation**
 - o Sw0 does NOT need to be cycled when sending signals to Sw1 – Sw 7
- If Sw0 = HIGH the *Sensor Management Station* ignores ALL other signals
 - o This function is NOT used regularly

Sw1 = Line STOP / HOLD signal

- If Sw1 = HIGH, the *SMS* goes to HOLD and freezes all sensor outputs
 - o This signal is typically activated when there is NO FLOW or pump is OFF
 - o A new Brand # signal will not be processed if Sw1 indicates a line stop
 - o Alarm #63 will be sent from *VS-300 SMS* to PLC when Sw1 is HIGH
- If Sw1 = LOW, the *SMS* assumes production conditions are normal
 - o Sw1 must be LOW to process a new brand #

Sw2 – Sw7 = Brand / Recipe change signals

- See *Fig. 4* on pp. 5-6
- If PLC sends a brand/recipe signal that does not exist in the *VS-300 SMS* the *SMS* will display “Invalid Product ID.”
 - o Alarm #04 will be sent from *VS-300 SMS* to PLC

NOTE: To create/modify your list of Brands/Recipes, you will need to access the *VS-3000 Dashboard Software* with remote desktop.

- Brand list is modified in EDIT >> ADD / DELETE / RENAME PRODUCT

Brand / Recipe Selection Mode:

There are 2 methods for changing brands / recipes

Method 1 (configured by default):

- Automatic brand/recipe change via PLC signals
 - o PLC wiring and integration must be completed for this option to work properly
 - o You can disable this option in the *VS-3000 Dashboard* software in the EDIT >> REMOTE / RELAY PARAMETERS menu

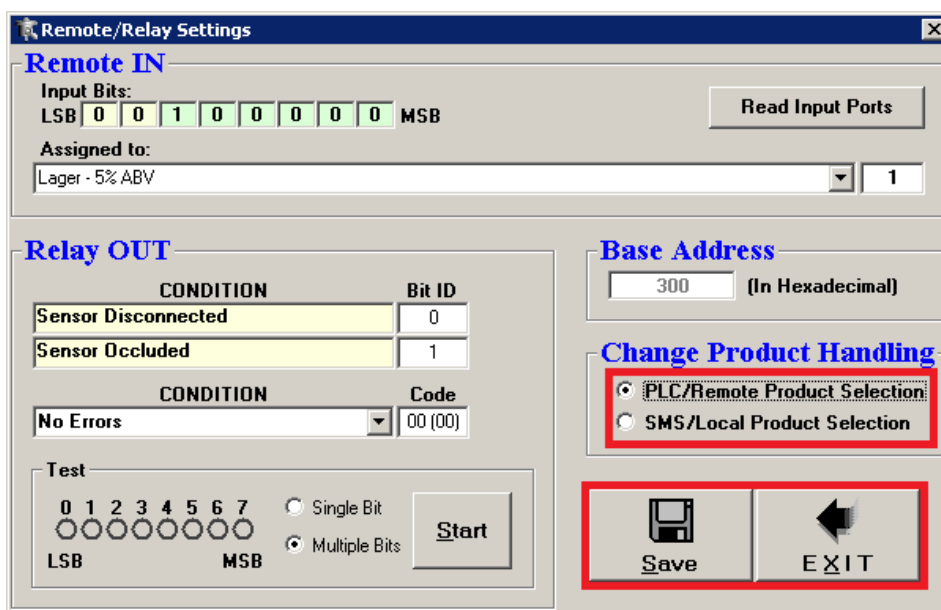


Fig. 5

Method 2 (Not recommended):

- Manual brand change via *VS-3000 Dashboard Software*
 - o Brands / Recipes are selected on the *VS-3000 Dashboard* screen via a drop-down list

PLC Logic - Relay-OUT (VS-300 SMS to PLC):

The VS-300 Sensor Management Station has the ability to send alarms/status codes to a PLC

- Alarms is displayed locally on VS-3000 Dashboard software and sent over Fieldbus
- Each code corresponds to a specific condition. See Figure 7 on pp. 10

Enable / Disable Alarms:

- Inner and Outer limits can be specified for each brand/recipe in VS-3000 Dashboard
 - o Go to EDIT >> PRODUCT PARAMETERS
 - o SPEC Limits are defined at the outer limits / release limits
 - o Control Limits are defined as inner limits / desired limits
- Specific alarms can be enabled or disabled in VS-3000 Dashboard
 - o Go to EDIT >> REMOTE / RELAY Parameters. See Figure 6

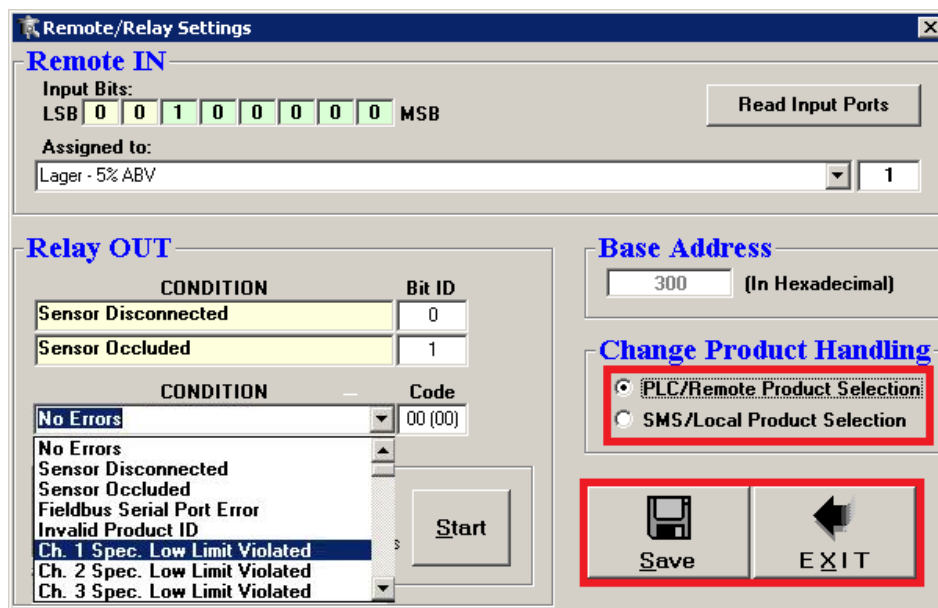


Fig. 6

Alarm Channel Labels

Soft Drinks and Juice

- Ch. 1 = °Brix
- Ch. 2 = Acid
- Ch. 3 = CO2
- Ch. 4 = Assay
- Ch. 5 = Acid (% Target)

Beer, Wine, Spirits

- Ch. 1 = Alcohol (%w/w or %m/m)
- Ch. 2 = Real Extract (°Plato)
- Ch. 3 = CO2
- Ch. 4 = OG / Stammuerze (°Plato)
- Ch. 5 = Alcohol (%v/v)

NOTE: Limits for each brand/recipe must be configured in the VS-3000 Dashboard. If limits are not configured by the user, alarms will not accurately represent whether or not the process is within specification.

Alarm Descriptions and Relays Signals:

| Alarm # | Description / Condition | Category | Relay-OUT Bit Identifier 0, 1, 2, 3, 4, 5, 6, 7 H = "high" / L = "low" bit signal | Priority | |
|---------|-----------------------------|--|--|------------------------|----|
| A | Sensor Disconnected | Sensor Alarms | H, L, L, L, L, L, L, L | 0 | |
| B | Sensor Occluded | | L, H, L, L, L, L, L, L | 0 | |
| Alarm # | Description / Condition | Category | Relay-OUT Bit Identifier 0, 1, 2, 3, 4, 5, 6, 7 H = "high" / L = "low" bit signal | Priority | |
| 1 | Sensor Disconnected | Sensor Alarms | H, L, H, L, L, L, L, L | 1 | |
| 2 | Sensor Occluded | | L, H, L, H, L, L, L, L | 2 | |
| 20 | Disk Is Full | SMS Disk Errors | L, L, L, L, H, L, H, L | 3 | |
| 21 | Low Disk Space | | L, L, H, L, H, L, H, L | 4 | |
| 63 | System on Hold | Line / Flow Status | L, L, H, H, H, H, H, H | 5 | |
| 3 | Fieldbus Connection Error | PLC Errors | L, L, H, H, L, L, L, L | 6 | |
| 4 | Invalid Product ID Received | | L, L, L, L, H, L, L, L | 7 | |
| 5 | Ch. 1 Spec Low | Process Quality Alarms (Specification / Outer Limits) | L, L, H, L, H, L, L, L | 8 | |
| 26 | Ch. 5 Spec Low | | L, L, L, H, L, H, H, L | 9 | |
| 6 | Ch. 2 Spec Low | | L, L, L, H, H, L, L, L | 10 | |
| 7 | Ch. 3 Spec Low | | L, L, H, H, H, L, L, L | 11 | |
| 22 | Ch. 4 Spec Low | | L, L, L, H, H, L, H, L | 12 | |
| 8 | Ch. 1 Spec High | | L, L, L, L, L, H, L, L | 13 | |
| 27 | Ch. 5 Spec High | | L, L, H, H, L, H, H, L | 14 | |
| 9 | Ch. 2 Spec High | | L, L, H, L, L, H, L, L | 15 | |
| 10 | Ch. 3 Spec High | | L, L, L, H, L, H, L, L | 16 | |
| 23 | Ch. 4 Spec High | | L, L, H, H, H, L, H, L | 17 | |
| 11 | Ch. 1 Control Low | | Process Quality Alarms (Control / Inner Limits) | L, L, H, H, L, H, L, L | 18 |
| 28 | Ch. 5 Control High | | | L, L, L, L, H, H, H, L | 19 |
| 12 | Ch. 2 Control Low | | | L, L, L, L, H, H, L, L | 20 |
| 13 | Ch. 3 Control Low | | | L, L, H, L, H, H, L, L | 21 |
| 24 | Ch. 4 Control Low | L, L, L, L, L, H, H, L | | 22 | |
| 14 | Ch. 1 Control High | L, L, L, H, H, H, L, L | | 23 | |
| 29 | Ch. 5 Control High | L, L, H, L, H, H, H, L | | 24 | |
| 15 | Ch. 2 Control High | L, L, H, H, H, H, L, L | | 25 | |
| 16 | Ch. 3 Control High | L, L, L, L, L, L, H, L | | 26 | |
| 25 | Ch. 4 Control High | L, L, H, L, L, H, H, L | | 27 | |

Fig. 7