
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)

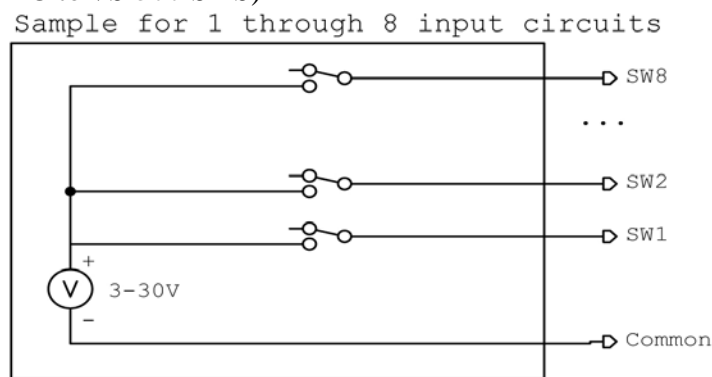


Fig. 1

- 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)

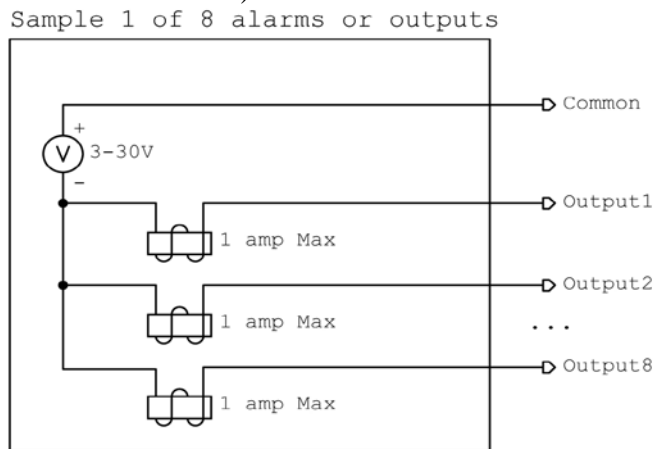


Fig. 2

- 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:

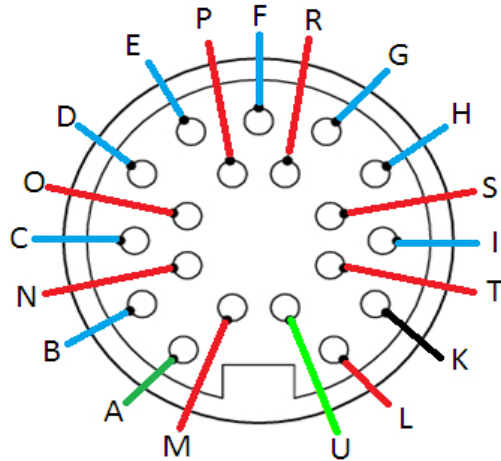


Fig. 3

- 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

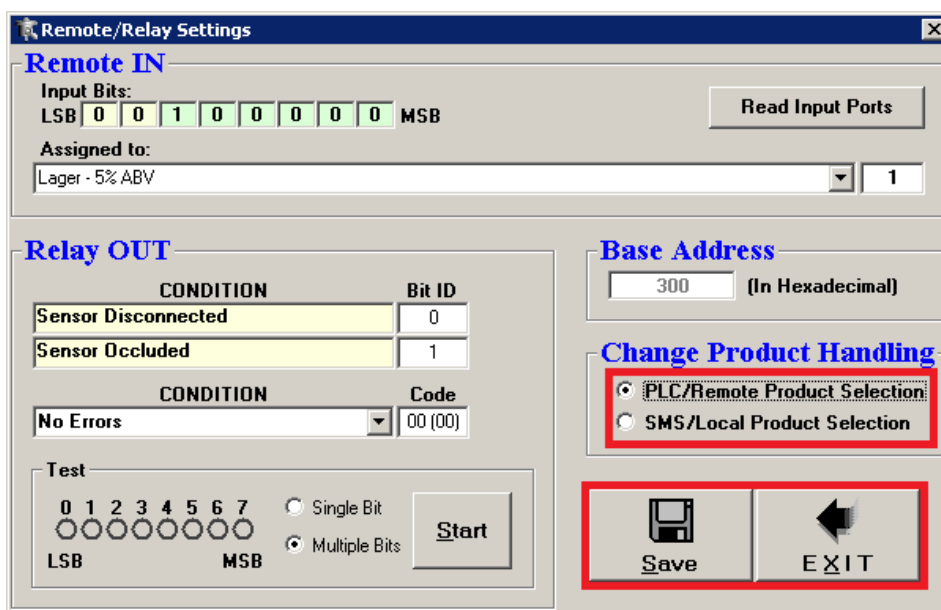


Fig. 5

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

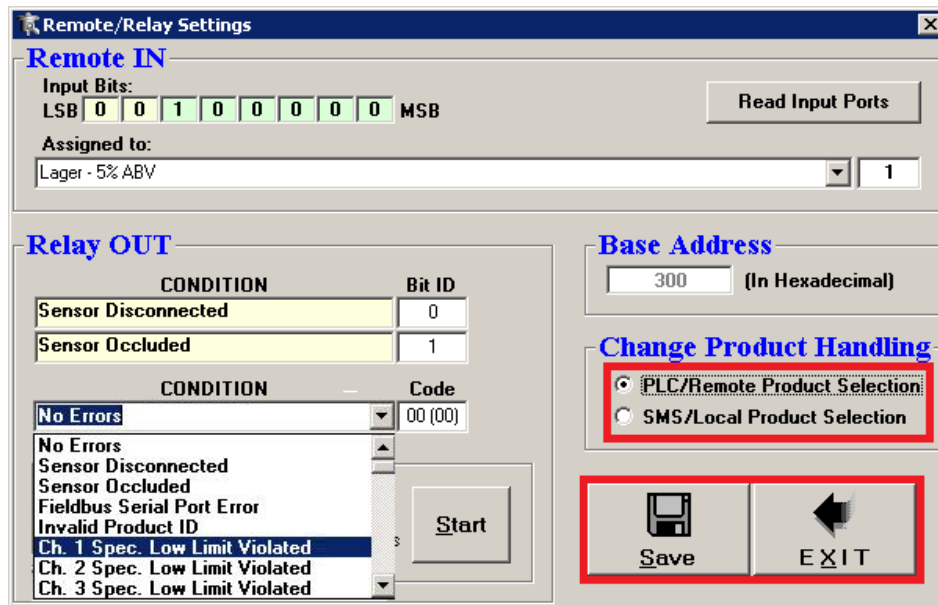


Fig. 6

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