Series 5 Vanguard
Duplex Discrete I/O FTA
FTA-554

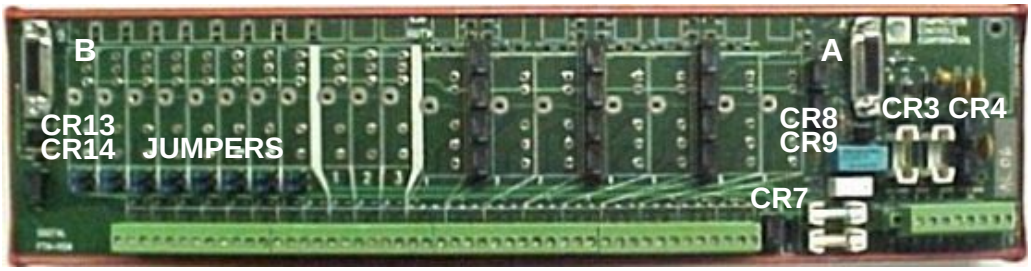

Figure 1 FTA-554 Simplex Discrete I/O Local FTA

This document specifies the duplex discrete Field Termination Assembly (FTA-554). This local FTA provides wiring terminals, signal isolation, and signal conditioning for up to 8 discrete inputs, 7 discrete outputs, and 3 frequency input signals in duplex Vanguard control systems.

See the following user manuals for installation and maintenance details:

- *Vanguard Duplex System Installation* manual [UM5105]
- *Vanguard Duplex System Maintenance* manual [UM5106]

Description

Connector A on the FTA-554 connects to the IOC transition module TIOC-555HD of the Primary IOC using an FTAC cable. Connector B on the FTA-554 connects to the IOC transition module of the Backup IOC using a separate FTAC cable. A second FTA-544 can be connected to the same duplex IOC pair to gain additional I/O:

- FTA 3 connector provides 8 discrete inputs, 7 discrete outputs, and 3 frequency inputs using CCC conditioning modules.
- FTA 4 connector provides 8 additional discrete inputs, 7 additional discrete outputs, and 3 additional frequency inputs using CCC conditioning modules.

Refer to the following data sheet for information on connecting local FTAs to the TIOC transition module:

- *Vanguard Local FTA Cable Assembly* [DS5207]

LED Indicators

The LED indicators on the FTA-554 can be seen in Figure 1 and are described in Table 1 on page 2. There is a red and green Healthy LED indicator for the FTA. Green LEDs (CR9-CR14) indicate the FTA is healthy and in control of the outputs. Red LEDs (CR8-CR13) indicate the FTA is not healthy and the output are disconnected. There are green LED indicators for the two power inputs (CR3-CR4), and a third for internal power (CR7).

Table 1 Duplex FTA-554 Indicator States

LED Status Indicator States							
CR3	**CR4**	**CR7**	**CR8**	**CR9**	**CR13**	**CR14**	**Description**
ON	–	–	–	–	–	–	Green: Power and Fuse Good for 24VA
–	ON	–	–	–	–	–	Green: Power and Fuse Good for 24VB
–	–	ON	–	–	–	–	Green: Power and Fuses Good for Internal
–	–	–	ON	OFF	–	–	Red: Healthy A fault: A outputs disconnected
–	–	–	OFF	ON	–	–	Green: Healthy A: A in control of outputs
–	–	–	–	–	ON	OFF	Red: Healthy B fault: B outputs disconnected
–	–	–	–	–	OFF	ON	Green: Healthy B: B in control of outputs

Installation

The FTA-554 is intended to be DIN-rail mounted. Access to the front and bottom is required. Assembly dimensions are shown in Figure 2. Refer to *Vanguard Duplex System Installation* manual [UM5105] for additional installation details and for CE installation.

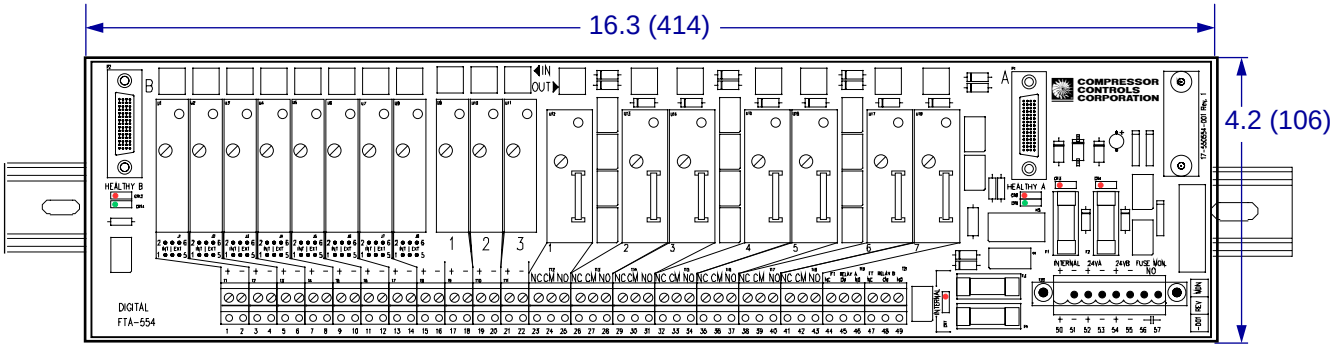

Figure 2 FTA-554 Dimensions

Connections

Terminal blocks are identified by using an alternating color scheme and a label above each conditioning module. See Table 2, Table 3 and Table 4 on page 4 for I/O signal terminal block assignments. See Table 5 on page 5 for power input terminal (T20) assignments. T20 is a removable terminal block.

Refer to *Vanguard Local FTA Cable Assembly* [DS5207] for information on connecting the local FTAs to the TIOC-555HD.

Note: Frequency inputs should use twisted-pair, shielded cables when routed through electrically noisy environments. The cable shields must be tied to Instrument Reference Ground (IRG) at one point only. Twisted-pair cable shields for frequency inputs must run continuously to the controller IRG bus. Refer to Cable Routing Requirements in Chapter 2 of UM5105 for details.

Table 2 Discrete Input Signal Terminal Assignments

Channel Numbers		Module Location	Terminal Block	Terminal Numbers
FTA3	**FTA4**			
DI 1	DI 9	1	T1	1 + 2 –
DI 2	AI 10	2	T2	3 + 4 –
DI 3	AI 11	3	T3	5 + 6 –
DI 4	AI 12	4	T4	7 + 8 –
DI 5	AI 13	5	T5	9 + 10 –
DI 6	AI 14	6	T6	11 + 12 –
DI 7	AI 15	7	T7	13 + 14 –
DI 8	AI 16	8	T8	15 + 16 –

Table 3 Frequency Input Signal Terminal Assignments

Channel Numbers		Module Location	Terminal Block	Terminal Numbers
FTA3	**FTA4**			
FI 1	FI 4	1	T9	17 + 18 –
FI 2	FI 5	2	T10	19 + 20 –
FI 3	FI 6	3	T11	21 + 22 –

Table 4 Discrete Output Signal & FT Relay Terminal Assignments

Channel Numbers		Module Location	Terminal Block	Terminal Numbers
FTA3	**FTA4**			
DO 1	DO 8	1	T12	23 – NC 24 – CM 25 – NO
DO 2	DO 9	2	T13	26 – NC 27 – CM 28 – NO
DO 3	DO 10	3	T14	29 – NC 30 – CM 31 – NO
DO 4	DO 11	4	T15	32 – NC 33 – CM 34 – NO
DO 5	DO 12	5	T16	35 – NC 36 – CM 37 – NO
DO 6	DO 13	6	T17	38 – NC 39 – CM 40 – NO
DO 7	DO 14	7	T18	41 – NC 42 – CM 43 – NO
--------	--------	FT Relay A	T19	44 – NC 45 – CM 46 – NO
--------	--------	FT Relay B	T21	47 – NC 48 – CM 49 – NO

Table 5 Power Input Terminal Assignments

Module Location	Terminal Block	Terminal Numbers
INTERNAL	T20	50 + 51 –
24VA		52 + 53 –
24VB		54 + 55 –
FUSE MON		56 – NO 57 – CM

Power Circuits

Terminal block T20 (see Table 5 on page 5) provides four power terminals for connecting dual power supplies to the conditioning modules. Diode isolation for the dual supplies is provided by the FTA-554.

Note: Power and Ground must be installed according to the requirements described in *Vanguard Duplex System Installation* manual [UM5105].

Discrete inputs can be powered from an external source or from the Internal 24 Vdc terminals of T20. Each discrete input can be independently jumpered to use either this common internal power or its own external power supply. See I/O Jumper Settings on page 7 for details.

Note: In order to preserve the isolation provided by the conditioning modules, the power supply used to power the field contacts (internal or external) should not be the same supply used to power the conditioning modules or any other part of the Series 5 system. If a common power supply is used, the field contacts will not be isolated. Do not connect the two supply commons (–) together.

Fuse Monitoring

A Normally-Open (NO) contact terminal on T20 provides fuse (and input power) monitoring of the 24VA and 24VB power. The NO terminal is tied in series to the NO contacts of the two power relays. The power fault relays are energized for normal operation and de-energized for a fault.

Healthy Relays

The healthy state of the local FTA is reported to the IOC card. When IOC A is Healthy, it is in control of the outputs and IOC B is disconnected. When IOC A is not Healthy and IOC B is Healthy, IOC B is in control of the outputs and IOC A is disconnected. If both IOCs are not Healthy, both are disconnected and the outputs are de-energized (NO). The healthy relays for the analog outputs on the local FTA are shown in Figure 3.

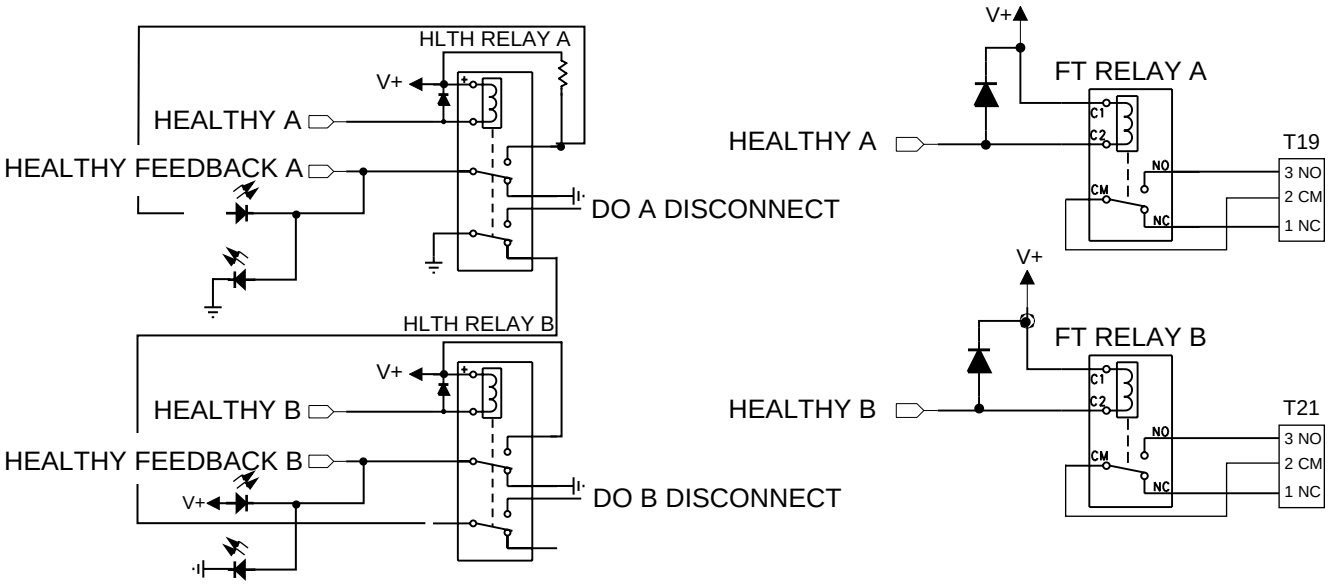

Figure 3 FTA-554 Healthy Relays and System Fault Relays

System Fault Relays

To satisfy fault relay requirements, duplex systems require each IOC set to have at least one local FTA of any type (analog or discrete). All FTA Fault relay contacts in the chassis will track each other. Terminal blocks T19 and T21 provide two screw terminals identified as a NO contact for the Fault relay. The NC terminals are not used. The system Fault relays are shown in Figure 3.

These fault relays will provide a system fault signal indicating a complete failure of the Vanguard controller with outputs in the fail-safe mode. To indicate a complete failure of the Vanguard controller, the NO contacts for FT Relay A and FT Relay B from one of the duplex FTAs must be connected in parallel.

Refer to System Fault Relay Wiring Connections in Chapter 13 of UM5105 for wiring instructions. Refer to System Switchover and Recovery in Chapter 5 of UM5106 for information on failure causes, indications, and alarms.

Note: The Fault relay follows the IOC Healthy relay and Healthy indicator LED. When the Healthy LED is green the System Fault and Healthy relays will be energized. When the Healthy LED is red they will be de-energized.

Note: The system-fault contact signal for the associated Vanguard controller must be connected to the DCS or PLC safety system.

I/O Circuits

Various I/O circuit types (conditioning modules) can be installed on the duplex discrete local FTA-554. Their functions differ slightly based on the conditioning module type. See *Local Conditioning Modules* [DS5210] for references to all local conditioning module data sheets.

I/O Jumper Settings

Each discrete input circuit includes a six-pin jumper, shown in Figure 4 on page 7, that matches it to internally or externally-powered field devices. Jumper pin assignments are defined in Table 6.

Caution: Circuit polarity is reversed when the local FTA is internally powered.

Table 6 Discrete Input Power Jumper Settings

INTERNAL POWER	EXTERNAL POWER
PIN 1 to PIN 3 and PIN 2 to PIN 4	PIN 3 to PIN 5 and PIN 4 to PIN 6

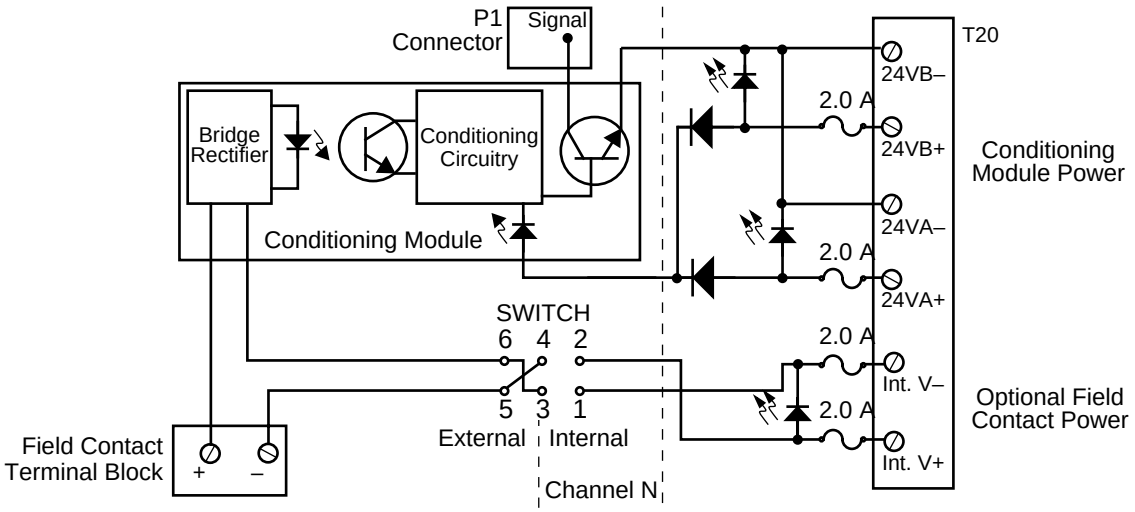

Figure 4 Simplified Schematic of Discrete Input Circuit

Discrete Channel Integrity Monitoring

The discrete input channels and the discrete output channels can be configured to monitor the external components of the field circuit. A discrete input channel can be configured as a Integrity Monitoring (IM) channel. See *External Integrity Monitoring (Digital Inputs and Outputs)* Technical Note [TN59] for IM channel configuration and installation.

Note: When internal power is used, both CM-2-102 and CM-2-101 must be in the same FTA.

Note: Local solid-state discrete outputs do not support circuit integrity monitoring. An open fuse is not detectable.

Note: When the discrete output relay is de-energized, a small amount of current will still be used by the discrete input module.

Specifications

Table 7 provides the FTA-554 specifications. Additional specifications relating to the FTA-554 are located in the following publications:

- *Vanguard Control System Hardware Specifications* [DS5001]
- *Vanguard Environmental Specifications* [DS5002]
- *Vanguard Control System Parts List* [DS5003]

Table 7 FTA-554 Specifications

Part Number	FTA-554
Product Revision	D3
24VA / 24VB Power	Voltage: 24 Vdc Max Current: 2 A Typ Current: varies by number of installed conditioning modules
I/O Channels	8 discrete inputs, 7 duplex discrete outputs, 3 frequency inputs
Discrete Modules	Discrete Input modules must output 1 to 5 Vdc to the IOC
Power Fuses	2.0A 250V Type F 5X20 mm Glass P#20-401820-020
Fuse Monitor Relay	1.0 A @ 30 V max
Mounting	DIN 1 (EN 50 035) or DIN 3 (EN 50 022)
I/O Signal Cables	AWG 22 (0.3 mm^2) to AWG 14 (2.1 mm^2)
Power Cable	AWG 12 (3.3 mm^2) max
Dimensions with case:	4.2" high x 16.3" wide x 4.0" deep (106 x 414 x 102 mm)

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