

SmartTILE-Fx

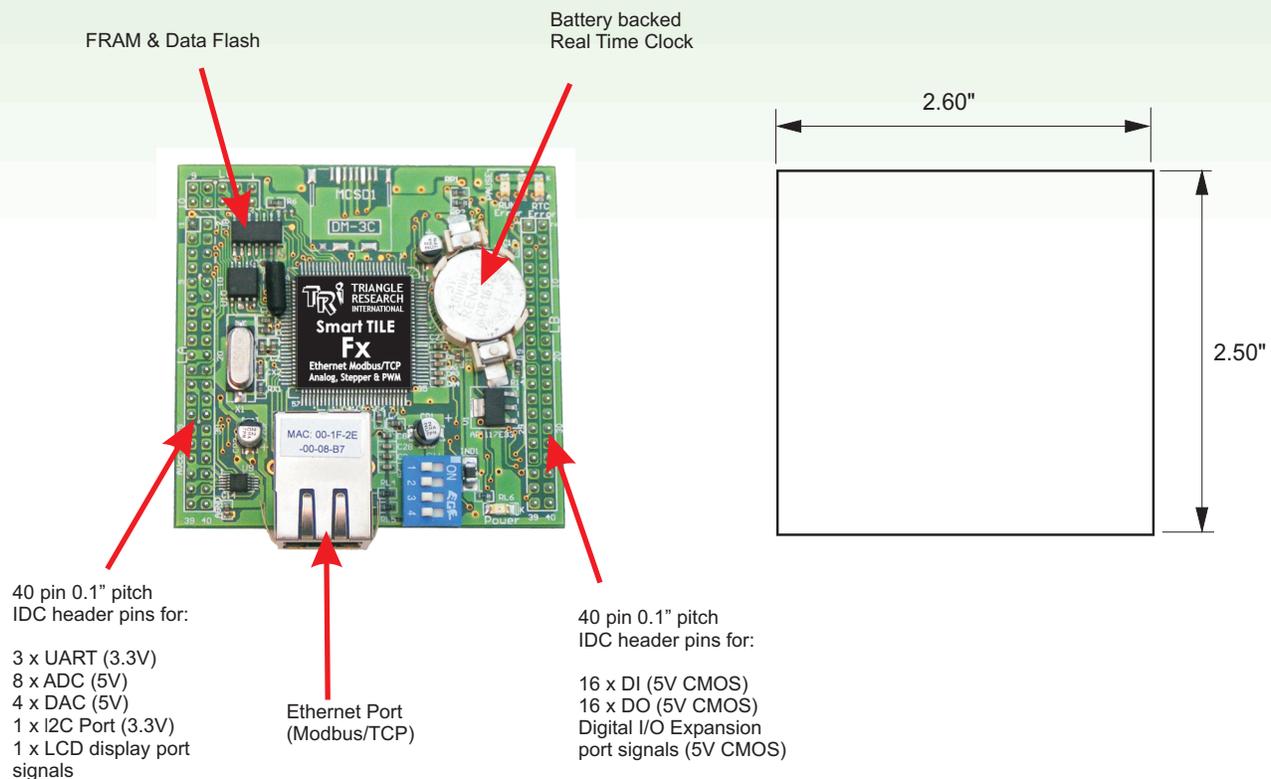
Ethernet, Modbus TCP/IP, Stepper Motor Drive, +Analog I/O, LCD port, RS232, RS485, Internet-TRiLOGI Ladder+Basic

Product Description

The SmartTILE (Smart TRi Integrated Logic Engine) is the brain of Triangle Research's high-end, time-tested and proven F-series PLCs. It is being made available to OEMs who recognize and want the power, capabilities and reliability of the F-series PLCs, but who also need some further customization in order to support the uniqueness of their application. With the SmartTILE, an OEM will have flexibility and be able to cut his time-to-market significantly by prototyping with standard F-series PLCs before committing to a higher-volume customized solution. The use of the highly acclaimed i-TRiLOGI programming language will further reduce development time compared with low-level C or assembly-language programming as in the case of other single-board computers (SBC).

All the critical components that make the F-series PLC stand out in the crowded controllers market are built into the SmartTILE. These include the Ethernet port, UART serial port, FRAM, RTC, file system and of course, the 5V digital and analog I/Os. As all the essential I/O signals to and from the SmartTILE can be communicated through two 40-pin, 0.1" headers, an OEM will find it easy to design and build a carrier/interface board specially for his application and yet fully access all the SmartTILE features mentioned.

While the SmartTILE comes ready with interface to 16 Digital Inputs and 16 Digital Outputs, it will address up to 128 Inputs and 128 Outputs with some additional circuitry on the OEM's carrier board. The SmartTILE also provides access to 8 Analog Inputs and 4 Analog Outputs.



The **SmartTILE-Fx** (Smart TRi integrated Logic Engine) integrates a 32-bit CPU, FRAM & flash memory, battery-backed Real Time Clock and Ethernet port on board. Its digital, analog and serial I/O signals are brought to OEM's carrier board via 3 sets of header pins.

Features and Specs

Power Supply	5V DC (Regulated to +/- 1%) >= 500mA	
Digital Inputs (16)	5V TTL Logic level input	
	Encoder Inputs	- 3 quadrature pairs. Multiplex with Input #1 to #6
	Pulse Measurement Inputs	- 6. Multiplex with input #1 to #6
	Interrupts	- 10. user-defined interrupt (latency < 0.5ms, +ve or -ve edge triggered). - Multiplex with Input #1 to 6 and 9 to 12
Digital Outputs (16)	5V HCMOS Level Logic output	
	PWM outputs	- 6 channels. Duty cycles from 0.00% to 100.00%. Frequency from 1Hz to 50KHz
	Stepper Motor control	- 3 channels, stepper speed from 1 to >= 20KHz
	Phase control (AC dimmer)	- 12 channels. Multiplex with output 5 to 16
Analog I/Os (8 AI, 4 AO)	- Input Interface	8 ch, 12 bit, 0-5V, 20KΩ input impedance
	- Output Interface	4 ch, 12 bit, 0-5V. Source current < 1mA per channel
I/O Expansion	Digital I/Os	Expandable to 128 inputs and 128 outputs using 6 x 5V HCMOS level signal pins.
	IIC	- 1 ch. 100KHz/400KHz selectable
	LCD Port	- 1 ch (require additional logic IC)
	Infrared remote control	- 1 ch (require additional infrared sensor)
Processing Speed	Program Scan time = 2us per step I/O Scan time = 0.5ms (can be interrupted by input interrupts),	
High-Speed Counter	3x high-speed counters, 6x pulse measurement channels (frequency, period and width) - simultaneous position and speed measurement on each channel.	
Counters	64	
Internal Relays / Timers	512 internal relays, 64 timers (any one or all can be configured as "HighSpeed" timers)	
Sequencers	8 with 32 steps (step# 0 - # 31)	
Real-Time Clock	Real Time Clock and Calendar (Year, Day, Month, Hours, Min, Sec, day-of-week) - Lithium CR1632 battery-backed (runs up to 5 years without ext'l power or 10 years if powered off only 1/2 of the time) - Real Time Clock can be updated with Atomic clock data from NIST time server if PLC is connected to the Internet	
PID	Built-in 16 channels PID Computation function (Proportional, Integral, Derivative digital control)	
Communicatons	Ethernet	- Direct connection to LAN or Internet for programming, monitoring and Remote Control - Support both Modbus/TCP Server (5 simult. connections) and Modbus/TCP Client - Extremely easy Peer-to-peer (or machine-to-machine) PLC communication. - TCP connection to any Server IP address:port number (e.g. to NIST Timer Server) - Event-driven Emailing. Create and save data file on a networked PC's hard disk - Excel spreadsheet Data Logging using TRI-ExcelLink software
	UART (3 channels)	Supported Protocols : Native ASCII Host Link Commands (programming/monitoring) MODBUS RTU, MODBUS ASCII, OMRON C20H Host Link Commands Default COM speed 38,400 bps, may be set from 1200 to 115.2K & 230.4K bps
Memory Storage	- Program	Max 23.5K words (16-bit) of program memory stored in flash memory.
	- Data	A to Z (32-bit Integer), A\$ to Z\$ (ASCII strings) ²DM[1] to DM[4000] (16-bit integer array). FP[1] to FP[1000] (32-bit Floating-point array) 6K Words (16-bit) additional non-volatile ¹FRAM memory for numeric and string storage
Programming Lang. / Env.	i-TRILOGI Version 6 and 7 (Ladder+Basic with Floating Point Support) / Windows	
Dimensions / Weight	Metric (LxWxH mm) : 66 x 64 x 24 / 35g Imperial (LxWxH) : 2.6" x 2.5" x 0.95" / 1.25 Oz	

PLC Environmental Specs (Temperature and Vibration)

Operating Temperature	- Operating -20 to +85 deg C (-4 to 185 deg F)
	- Storage -40 to +85 deg C (-40 to 185 deg F)
Operating Humidity	10% - 90% Rel. Humidity, non condensing

Absolute Max. Rating

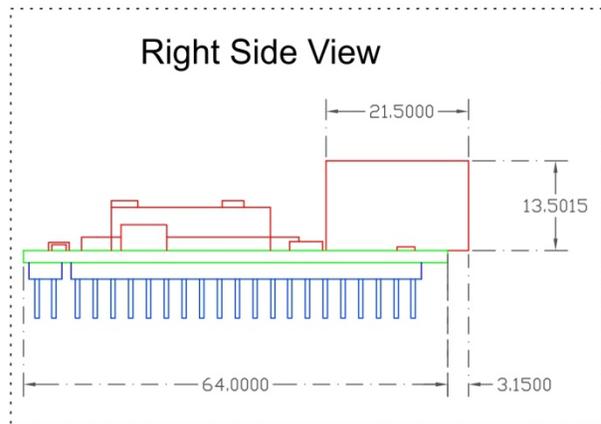
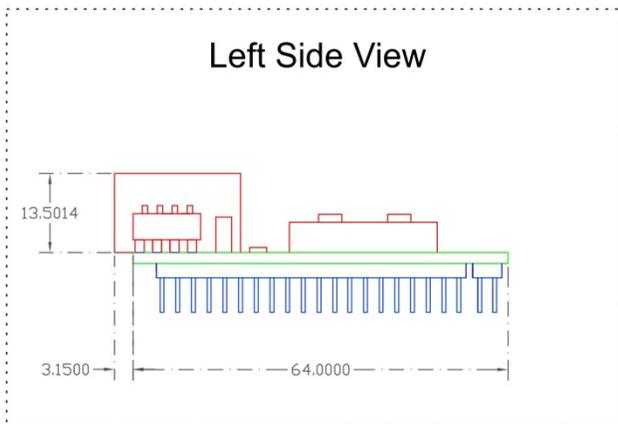
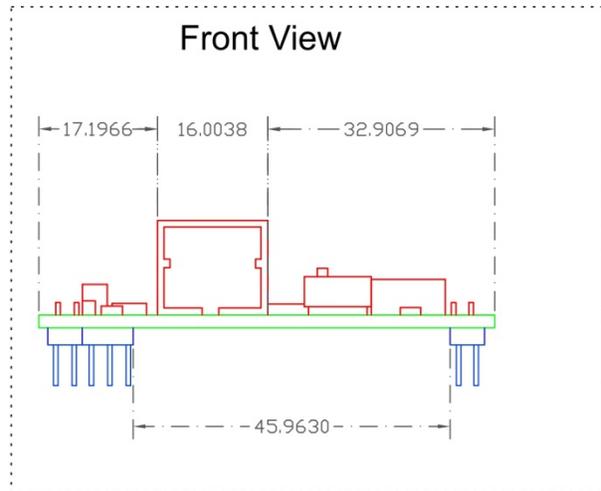
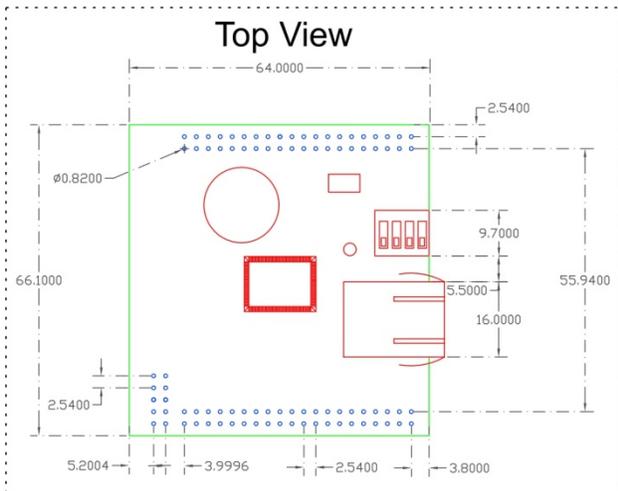
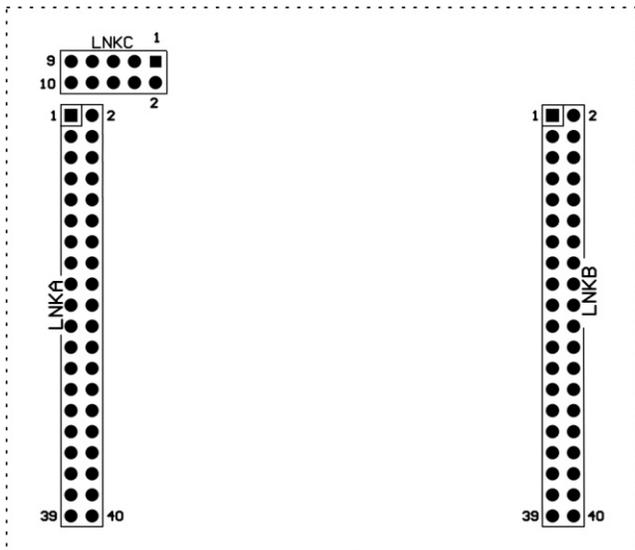
Power Supply Input	7V
Digital Inputs	7V
Digital Outputs	7V
Analog Channels (0 to 5V)	7V

Tel: 1-877-TRI-PLCS (1-877-874-7527)
Web: <http://www.triplc.com/smartTILE>

¹FRAM: State-of-The-Art, Ferro Magnetic RAM.
No battery required. Unlimited read/write cycles

²DM[]: DM[1]-DM[4000] and FP[1] to FP[1000] automatically backup in FRAM and are therefore can be non-volatile.

SmartTILE-Fx Connector Pin outlines and Physical Dimensions



SmartTILE-Fx I/O Connector Pin Signals

LINKA				
PIN	FUNCTION #	FUNCTION TYPE	DESCRIPTION	MAX VOLTAGE
A1	1	+5V DC	SmartTILE power input - External 5V source required	5V
A2	1	LCD_TxD	LCD Serial Data Transmission	3.3V
A3	1	LCD_LAT	LCD Data Storage Register Clock	3.3V
A4	1	LCD_RS	LCD Register Select on Hitachi HD44780 Controller	3.3V
A5	1	LCD_E	LCD Start Data Read/Write on Hitachi HD44780 Controller	3.3V
A6	1	COMM3_TXD	COMM3 UART Serial Data Transmission	3.3V
A7	1	COMM3_RXD	COMM3 UART Serial Data Receive	3.3V
A8	1	COMM3_RTS	COMM3 UART Ready To Send Signal	3.3V
A9	1	COMM2_TXD	COMM2 UART Serial Data Transmission	3.3V
A10	1	COMM2_RXD	COMM2 UART Serial Data Receive	3.3V
A11	1	COMM2_RTS	COMM2 UART Ready To Send Signal	3.3V
A12	1	COMM1_TXD	COMM1 UART Serial Data Transmission	3.3V
A13	1	COMM1_RXD	COMM1 UART Serial Data Receive	3.3V
A14	1	COMM1_RTS	COMM1 UART Ready To Send Signal	3.3V
A15	1	RESERVED	RESERVED	N/A
A16	1	RESERVED	RESERVED	N/A
A17	1	RESERVED	RESERVED	N/A
A18	1	RESERVED	RESERVED	N/A
A19	1	DGND	Digital I/O Common	0V
A20	1	DGND	Digital I/O Common	0V
A21	1	RESERVED	RESERVED	N/A
A22	1	RESERVED	RESERVED	N/A
A23	1	SCL	I2C Serial Clock	5V
A24	1	SDA	I2C Serial Data	5V
A25	1	ADC1	Analog Input #1 : 12-bit : 0-5V	5V
A26	1	ADC2	Analog Input #2 : 12-bit : 0-5V	5V
A27	1	ADC3	Analog Input #3 : 12-bit : 0-5V	5V
A28	1	ADC4	Analog Input #4 : 12-bit : 0-5V	5V
A29	1	ADC5	Analog Input #5 : 12-bit : 0-5V	5V
A30	1	ADC6	Analog Input #6 : 12-bit : 0-5V	5V
A31	1	ADC7	Analog Input #7 : 12-bit : 0-5V	5V
A32	1	ADC8	Analog Input #8 : 12-bit : 0-5V	5V
A33	1	Avcc(IN)	Analog Reference Voltage for Sensor Power	5V
A34	1	AGND	Analog Ground (Connected to Digital I/O Common)	0V
A35	1	Avcc(IN)	Analog Reference Voltage for Sensor Power	5V
A36	1	DAC1	Analog Output #1 : 12-bit : 0-5V	5V
A37	1	DAC2	Analog Output #2 : 12-bit : 0-5V	5V
A38	1	DAC3	Analog Output #3 : 12-bit : 0-5V	5V
A39	1	DAC4	Analog Output #4 : 12-bit : 0-5V	5V
A40	1	AGND	Analog Ground (Connected to Digital I/O Common)	0V

LINKB

PIN	FUNCTION #	FUNCTION TYPE	DESCRIPTION	MAX VOLTAGE
B1	1	DO1	Digital Output #1	5V
B2	1	DO2	Digital Output #2	5V
B3	1	DO3	Digital Output #3	5V
B4	1	DO4	Digital Output #4	5V
B5	1	DO5	Digital Output #5	5V
	2	PWM1	Pulse Width Modulation Channel #1 : 1Hz-50kHz	5V
	3	STEP_DR1_A	Stepper Motor Driver Channel #1 Phase A : 1-10kHz	5V
	4	STEP_DIR_1	Stepper Motor Controller Channel #1 Direction signal : ON/OFF	5V
B6	1	DO6	Digital Output #6	5V
	2	PWM2	Pulse Width Modulation Channel #2 : 1Hz-50kHz	5V
	3	STEP_DR1_A	Stepper Motor Driver Channel #1 Phase A : 1-10kHz	5V
	4	STEP_PUL_1	Stepper Motor Controller Channel #1 Pulse signal : 1-10kHz	5V
B7	1	DO7	Digital Output #7	5V
	2	PWM3	Pulse Width Modulation Channel #3 : 1Hz-50kHz	5V
	3	STEP_DR1_B	Stepper Motor Driver Channel #1 Phase B : 1-10kHz	5V
B8	1	DO8	Digital Output #8	5V
	2	PWM4	Pulse Width Modulation Channel #4 : 1Hz-50kHz	5V
	3	STEP_DR1_B	Stepper Motor Driver Channel #1 Phase B : 1-10kHz	5V
B9	1	DO9	Digital Output #9	5V
	2	STEP_DR2_A	Stepper Motor Driver Channel #2 Phase A : 1-10kHz	5V
	3	STEP_DIR_2	Stepper Motor Controller Channel #2 Direction signal : ON/OFF	5V
B10	1	DO10	Digital Output #10	5V
	2	STEP_DR2_A	Stepper Motor Driver Channel #2 Phase A : 1-10kHz	5V
	3	STEP_PUL_2	Stepper Motor Controller Channel #2 Pulse signal : 1-10kHz	5V
B11	1	DO11	Digital Output #11	5V
	2	STEP_DR2_B	Stepper Motor Driver Channel #2 Phase B : 1-10kHz	5V
B12	1	DO12	Digital Output #12	5V
	2	STEP_DR2_B	Stepper Motor Driver Channel #2 Phase B : 1-10kHz	5V
B13	1	DO13	Digital Output #13	5V
	2	STEP_DR3_A	Stepper Motor Driver Channel #3 Phase A : 1-10kHz	5V
	3	STEP_DIR_3	Stepper Motor Controller Channel #3 Direction signal : ON/OFF	5V
B14	1	DO14	Digital Output #14	5V
	2	STEP_DR3_A	Stepper Motor Driver Channel #3 Phase A : 1-10kHz	5V
	3	STEP_PUL_3	Stepper Motor Controller Channel #3 Pulse signal : 1-10kHz	5V
B15	1	DO15	Digital Output #15	5V
	2	STEP_DR3_B	Stepper Motor Driver Channel #3 Phase B : 1-10kHz	5V
B16	1	DO16	Digital Output #16	5V
	2	STEP_DR3_B	Stepper Motor Driver Channel #3 Phase B : 1-10kHz	5V
B17	1	DGND	Digital I/O Common	0V
B18	1	DGND	Digital I/O Common	0V
B19	1	EXP_SCLK	Expansion Board Serial Data Clock Signal	5V
B20	1	EXP_TxD	Expansion Board Serial Data Transmit Signal	5V
B21	1	EXP_LAT	Expansion Board Data Storage Register Clock	5V
B22	1	EXP_OE	Expansion Board Output Enable Control	5V

(Continue from previous page: Connector LINK B pin signals)

B23	1	EXP_RxD	Expansion Board Serial Data Receive Signal	5V
B24	1	EXP_PLOAD	Expansion Board Parallel Data Shift/Load Control	5V
B25	1	DI1	Digital Input #1	5V
	2	INT_1	User Defined Interrupt Ch #1	5V
	3	HSC_1_A	High Speed Counter Ch #1 Phase A : 0-10kHz	5V
	4	PM_1	Pulse Measurement Ch #1 (Width/Period/Frequency) : 0-10kHz	5V
B26	1	DI2	Digital Input #2	5V
	2	INT_2	User Defined Interrupt Ch #2	5V
	3	HSC_1_B	High Speed Counter Ch #1 Phase B : 0-10kHz	5V
	4	PM_2	Pulse Measurement Ch #2 (Width/Period/Frequency) : 0-10kHz	5V
B27	1	DI3	Digital Input #3	5V
	2	INT_3	User Defined Interrupt Ch #3	5V
	3	HSC_2_A	High Speed Counter Ch #2 Phase A : 0-10kHz	5V
	4	PM_3	Pulse Measurement Ch #3 (Width/Period/Frequency) : 0-10kHz	5V
B28	1	DI4	Digital Input #4	5V
	2	INT_4	User Defined Interrupt Ch #4	5V
	3	HSC_2_B	High Speed Counter Ch #2 Phase B : 0-10kHz	5V
	4	PM_4	Pulse Measurement Ch #4 (Width/Period/Frequency) : 0-10kHz	5V
B29	1	DI5	Digital Input #5	5V
	2	INT_5	User Defined Interrupt Ch #5	5V
	3	HSC_3_A	High Speed Counter Ch #3 Phase A : 0-10kHz	5V
	4	PM_5	Pulse Measurement Ch #5 (Width/Period/Frequency) : 0-10kHz	5V
B30	1	DI6	Digital Input #6	5V
	2	INT_6	User Defined Interrupt Ch #6	5V
	3	HSC_3_B	High Speed Counter Ch #3 Phase B : 0-10kHz	5V
	4	PM_6	Pulse Measurement Ch #6 (Width/Period/Frequency) : 0-10kHz	5V
B31	1	DI7	Digital Input #7	5V
B32	1	DI8	Digital Input #8	5V
B33	1	DI9	Digital Input #9	5V
	2	INT_9	User Defined Interrupt Ch #9	5V
B34	1	DI10	Digital Input #10	5V
	2	INT_10	User Defined Interrupt Ch #10	5V
B35	1	DI11	Digital Input #11	5V
	2	INT_11	User Defined Interrupt Ch #11	5V
B36	1	DI12	Digital Input #12	5V
	2	INT_12	User Defined Interrupt Ch #12	5V
B37	1	DI13	Digital Input #13	5V
B38	1	DI14	Digital Input #14	5V
B39	1	DI15	Digital Input #15	5V
B40	1	DI16	Digital Input #16	5V

LINKC

PIN	FUNCTION #	FUNCTION TYPE	DESCRIPTION	MAX VOLTAGE
C1	1	XBEE_RESET	XBEE Module Reset Control	3.3V
C2	1	IR_REMOTE	Infrared sensor input	3.3V
C3	1	SPI_RxD	SPI Receive Data	3.3V
C4	1	SPI_TxD	SPI Transmit Data	3.3V
C5	1	SPI_CLK	SPI Clock Signal	3.3V
C6	1	SPI_CS0	SPI Chip (Slave) Select	3.3V
C7	1	PWR_FAIL	Power Failure Interrupt Voltage Divider Input	3.3V
C8	1	RESERVED	RESERVED	N/A
C9	1	RESERVED	RESERVED	N/A
C10	1	DGND	Digital I/O Common	0V