

TCF-10B Specifications

System Specifications

Frequency Range	30–535 kHz in 0.5 kHz (500 Hz) steps, transmitter selection in 100 Hz steps
4-Wire Receiver Input Impedance	5,000Ω or (1,000Ω when strapped for high sensitivity)
RF Input Impedance	50Ω, 75Ω or 100Ω (nominal unbalanced)
Output Power	10 watts (max), 0.1 watt (min.)
Harmonic & Spurious Output	55dB below 10W
Output Variation	±1dB over temp./voltage range
Modulation Type	Frequency-Shift Keyed (FSK); strappable for either two or three-frequency operation
Frequency Shift	Narrow shift (± 100Hz) Wide shift (± 250Hz) Extra Wide shift (± 500Hz)
Frequency Stability (All bands)	±10Hz
Nominal Receiver Bandwidths	Narrow Band (380Hz at 3dB points) Wide Band (800Hz at 3dB points) Extra Wide Band (1,600Hz at 3dB points)
In-Band SNR	w/o voice 13dB w/voice 30dB
Receive Sensitivity	(Std. Setting) 22.5mV (min.) to 70V (max.) / –20dBm to +50dBm @ 50Ω (High Setting) 5mV (min.) to 17V (max.) / –35dBm to +38dBm @ 50Ω

Frequency Spacing:*

Narrow Band	Unblock or Transfer Trip	(1-way, 500 Hz) (2-way, 1,000 Hz)†
Wide Band (Narrow or Wide Shift)	Unblock or Transfer Trip	(1-way, 1,000 Hz) (2-way, 2,000 Hz)†
	Phase Comparison (SKBU-2A) (60Hz sq. wave keying)	(1-way, 1,500 Hz) (2-way, 3,000 Hz)†
	Phase Comparison (SPCU-1A) (60Hz 3ms pulse keying)	(1-way, 2,000 Hz) (2-way, 4,000 Hz)†
Extra Wide Band	Unblock or Transfer Trip	(1-way, 2,000 Hz) (2-way, 4,000 Hz)†
	Phase Comparison (SKBU-2A) (60Hz sq. wave keying)	(1-way, 1,500 Hz) (2-way, 3,000 Hz)†
	Phase Comparison (SPCU-1A) (60Hz 3ms pulse keying)	(1-way, 2,000 Hz) (2-way, 4,000 Hz)†
All Voice Applications	Minimum Channel spacing	(2-way, 4,000 Hz)†

Channel Speed at 15 dB Margin

Narrow Band	7.5ms*
Wide Band	5.9ms*
Extra Wide Band	4.7ms*

1-way represents transmitter to transmitter or receiver to receiver

2-way represents transmitter to receiver

* Times do not include logic trip delay or relay operate times.

† An external hybrid or other device offering at least 20dB rejection of the adjacent channel must be used in the application.

Outputs

Power Supply Module	Loss of dc power
Receiver Module	Low-Signal RF received CLI output for Ext. CLI Meter (–20dB to +10dB; 0–100×A)
Five 1A Isolated outputs for 15/20Vdc or station battery circuits	1) Unblock or Trip or Trip Positive
	2) Low-Level or Low Signal
	3) Guard or Trip-Negative
	4) Noise
	5) Checkback Trip (not used w/Phase Comparison)
Keying Module	Shift High/ Shift Low
10W PA Module	Loss of RF power output

Electro-mechanical Outputs

Six (6) contacts for Guard or Trip 1 or Trip 2	Make and carry rated 30A for 1 sec.; 10A cont. capability break 50W resistive or 25W with L/R = .045 sec.
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PLC Power-Line Carrier

Electro-Mechanical Output Timing

Operate Time		Release Time	
NO Contact	NC Contact	NO Contact	NC Contact
Closes	Opens	Opens	Closes
2.8 ms	2.0 ms	2.8 ms	3.9 ms
1.9 ms bounce		4.0 ms bounce	

Voice Adapter Option Specifications

Modulation	Amplitude Modulation with compandor
Transmission	Full-Duplex
Frequency Response	300 Hz to 2 kHz
Signaling	370 Hz AM w/signaling push-button

Environmental Specifications

Ambient Temp. range of air	-20 to +60°C (derated per Table 1-14 in system manual) (ANS C37.90)
Relative Humidity	Up to 95% (non-condensing) at 40°C (for 96 hrs. cumulative) (ANS/UL 508)
Altitude	Up to 1,500m (without derating), 6,000m (using Table 1-13 & 1-14 in system manual)
SWC Transient	All external user interfaces meet SWC specifications of ANS C37.90.1 (1989)
1-minute withstand	Only isolated inputs and outputs, and all alarms: 2,500 Vdc from each terminal to ground derated per Table 1-13 in system manual (IEC 255-5)
Center conductor of coaxial cable to ground	3,000 Vdc impulse level, using 1.2 x 50 msec impulse
Electro-Magnetic Interference Compatibility	IEEE Standard (ANS C37.90.2)

Power Requirement Specifications

Transceiver		Supply Current (Amps) at Nominal voltage		
Nominal Battery Voltage	Permissible Voltage Range	Receive/Standby	1 Watt Transmit	10 Watt Transmit
48/60 Vdc	38–70 Vdc	.630	.940	1.600
110/125 Vdc	88–140 Vdc	.240	.360	.600
220/250 Vdc	176–280 Vdc	.120	.180	.300
Permissible ripple on incoming Vdc				5%
Maximum allowable frequency of ripple				120 Hz
Carrier frequency on dc input leads when transmitting 10W				20 mV (max)

Altitude Dielectric Strength De-Rating for Air Insulation

Altitude (Meters)	Correction Factor
1,500	1.00
1,800	0.97
2,100	0.94
2,400	0.91
2,700	0.87
3,000	0.83
3,600	0.79
4,200	0.74
4,800	0.69
5,400	0.64
6,000	0.59

Keying Specifications

Five (5) optically-isolated keying inputs strappable at 15/20, 48, 125, & 250Vdc	1) Unblock or Phase Comparison
	2) Direct Transfer Trip
	3) Power Boost or 52b keying
	4) RF Power On/Off
	5) Voice Adapter
Maximum input keying burden	10 mA
Manual Keying	Recessed push-button switches for high and low-freq. keying and power boost

Altitude Correction for Maximum Temperature of Cooling Air (ANS C93.5)

	Temperature (Degrees C)			
	From Usual			
Usual	1,500	55	40	–
Unusual	2,000	53	38	2
Unusual	3,000	48	33	7
Unusual	4,000	43	28	12

Weight and Dimension Specifications

Equipment	Net Weight		Height		Width		Depth		Rack space
	lbs	Kg	in.	mm	in.	mm	in.	mm	
Transceiver	21	9.53	5.25	133.4	19.00	482.6	13.50	342.9	3 RU
Transmitter	14	6.35	5.25	133.4	19.00	482.6	13.50	342.9	3 RU
Receiver	12	5.45	5.25	133.4	19.00	482.6	13.50	342.9	3 RU