JAQUET FT 3000 OVERSPEED PROTECTION





Features

- High integrity redundant system concept
- Fast 10ms reaction time to over speed
- Acceleration measurement with set point control
- 3 status and 4 limit relays per channel internal relay voting e.g. 1003, 2003
- Isolated analogue outputs with scaleable ranges
- Voted /averaged and max speed values
- Clear front panel displays of unit status control functions via binary inputs or PC
- 3 level password protection

The FT 3000 Advantage

- Up to 3 shafts monitored in one rack
- Trip Chain Control Card includes temperature and other trips
- Multiple set points and status outputs
- On line self testing via internal generators and channel cross checking
- Hot module exchange configuration and status monitoring via PC
- · Direction sensing
- · Sensor, power and system watchdogs
- MTBF measured in 100's of years

Maximum security without sacrificing system availability

Multi-channel overspeed protection and monitoring system

Protection

Multi shaft aero derivative gas turbines
Common solution for combined gas/steam turbine
Compressor overspeed protection in chemical plants
Pump monitoring and control
Hydro electric power stations
Demanding marine applications

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Module Overview

The FT 3000 is comprised of modules that are configured in a 19" rack to suit the particular application.

A measurement channel may be just a FTFU 3024 motherboard or a combination of motherboard + FTV 3090 relay card + FTW 3013 analog card.

FTFU 3024 Motherboard

Overview One per channel (sensor). Performs measurement and watchdog functions. 3 hardwarespeed

limit monitors for fast over speed detection plus one comparator for acceleration limit. 3 single contact change over relays for status or limits. 3 test generators for on line testing.

Max speed memory. Direction sensing. Front panel LED's for system status.

Measuring range Lowest: 0...1 Hz Highest: 0... 35 kHz

Accuracy 0.1% of the set point

Set points

Range See above. Values in rpm once number of gear teeth entered.

Hysteresis Individually programmable High switching and Low reset values for each limit. Configurable

number of teeth used for limit control.

Response time Over speed typically signalled via relay output in 10ms

Sensor input Isolated. Input voltage: 50 mV . . . 80 Vrms.

Input impedance 100 kOhms, suitable for passive or active sensors;

Adjustable trigger level 0...+3.5 V.

Sensor supply 14 V, 25 mA. (Short circuit proof; 40 mA)

Sensor monitoring Static: Low & High consumption values selectable in the range 0.5...3omA. Sensors with

consumption I min. or > I max. are signalled as defective.

Dynamic: Programmable channel cross check values.

Sensor fault may be assigned to a relay.

Binary inputs May be assigned to control functions e.g. on line testing, trip reset, lamp test.

B. 1 & 2. Not isolated. + 5 V level with pull up resistor

Low, active = 0...+1 V High = + 3,5...+33 V or open B. 3 to 6: Isolated. Low = 0...+5 V or open; High = +10...+33 V.

Frequency outputs Sensor signal repeat with insignificant time delay.

Push-pull square wave o/p. Isolated. Amplitude 15 Vpp. 100 Ohms source impedance.

FTV 3090 Relay card

Overview Added to motherboard as required. 4 relays, each having 4 change over contacts.

May be assigned to any limit or status function. Used for voting control e.g. 2003 trip out

puts. Front panel status LED's

Relays Potential free, selectable normal/inverse mode

250 VAC, 2 A, 125 VA $\,/\,$ 220 VOC, 2 A, 60 W

UL / CSA rating: AC: 30 V, 2 A, 60 VA DC: 60 V, 2 A, 60 W

Programmable non latching, monostable or latch modes

FTW 3013 Analogue card

Overview Added to motherboard, as required, with or without relay card. 3 isolated and independently

scaleable ranges. May be assigned to any measured, calculated or stored value e.g. max speed.

Analog outputs $3 \times 0/4... 20 \text{ mA}$, configurable for narrow or wide speed ranges.

Programmable rising or falling characteristic. Resolution: 12 bit corresponding to 1:4096.

Maximum linearity error: 0.1 %



FTBU 3034 Trip chain control card

Overview Combines 6 different trip commands to provide global shutdown control. 6 potential free change-

over relay contacts (K1-6) are created from 6 opto-couppled inputs (IN1-6) in a 1:1 relationship. An additional output (OUT) comprises of two relays that each provide a change-over contact. These contacts allow 2 out of 3 voting in a three FTBU 3034 card system. The OUT output is driven by a logical combination of six inputs: OUT is active (de-energized) when the following equation is true. IN1 & IN2 + IN3 & IN4 + IN5 + IN6 - where INi means an active input (low level). This function allows the FTBU card to provide optimum combination of commands in the trip chain and simplify system

wiring.

On board self-diagnostics for PSU & logic function. Trip chain self test facility.

INPUT: IN1 - IN6 Potential free, 20-50 V, active level is OV. Isink: Min 10 mA, Max 15 mA
 OUTPUT: K1 - K6 Relay Ki is energized when INi is high. Potential free change over contact.

AC Umax 250 V Imax 5 A Pmax1250 VA
DC Umax 30 V Imax 5 A Pmax 150 W

OUTPUT OUT 2 potential change over contacts

AC Umax 250V Imax 2A Pmax 125 V DC Umax 220V Imax 2A Pmax 60W

Reaction time INi to Ki and OUT: M 8 ms

TEST input Active level is 5-48 V. Isink M 15 mA.

FTK 3073 Communications card

Overview Communications card; one per rack; used with FT 3000 Windows software supplied with each unit.

Data I/O USB Interface

Power supply modules

Overview 1 or any combination of 2 per rack. Motherboards diode decouple 2 PSU lines for redundancy and

monitor supply status. Supply status is available for relay control.

FTZ 3061 115 or 230 Vac, -20, +15%, 50 / 60 Hz FTZ 3062 24 or 48 Vac, -20, +15%, 50 / 60 Hz

FTZ 3064 14...70 Vdc

FTZ 3065 88...372 Vdc / 85...264 Vac

FTZ 3069 Filter only. 19...33 Vdc (rack bus supply)

Environmental Operating temp o...+60°C, (+70°C for max 2 hours)

Storage temp $-25...+85^{\circ}$ C rH 75% yearly average, max 90% over 30 days

All FT 3000's are supplied with a CD-Rom providing full documentation and the FT 3000 Windows® Software. The software allows:

• Configuration of all operating parameters • Unit interrogation of identity and parameters

• PC display of current measurement and relay status • Archiving and printing of the configuration

Full technical details can be seen in the detailed specification. Please note: Information is subject to change. For more technical information please refer to operating instructions.



Swiss know-how and quality matched to your demands

JAQUET manufactures speed sensors in quantities from 1 to 200,000 per project per year. These typically customer specific solutions add value through being matched to individual applications.

Since 1889, a spirit of excellence complementing tradition and innovation.



Automotive turbochargers

Turbocharger for trucks, passenger cars, construction equipment

- Speed of VG/VNT turbochargers
- Gearbox shaft and retarder speed



Railway systems

- · Optimum traction control
- WSP (wheel slide protection) systems
- Speed information for automatic train control



Power generation

Gas, hydro, steam and wind turbines

- Overspeed protection
- Speed measurement and control



Hydraulics

Agricultural machinery, construction and mining equipment, cranes,

ROV - remote operated vehicles

- · Motors and pumps, flowrate measurement
- · Position measurement, traction synchronization



Diesel and gas engines

Large diesel and gas engines in marine, rail, off-road applications and power production.

- \bullet Cam and crank shaft for dynamic position
- Turbocharger speed, engine diagnostics

Quality systems

ISO TS 16949 ISO 9001 AS 9100 IRIS



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