DS200TCQC – Analog IO Expander Board

The Analog IO Expander board (TCQC) provides scaling and conditioning for additional analog signals read from the terminal boards of the I/O cores. The TCQC board provides LVDT and LVDR excitation. The IONET termination for <Q11> and <P1> is on the TCQC board in the <R1> core. If the optional <21> is installed, that IONET termination is on the TCQC in <R2>. The mA input for the megawatt transducer signal is scaled and conditioned on the TCQC board and written to the STCA board via the 19PL connector. Pulse rate inputs are scaled and conditioned on the TCQC board. In most applications, the high pressure shaft speed signals and occasionally the liquid fuel flow signals are scaled on the TCQC board and written to the TCQA board via the JE connector in the <R1> core. The TCQC board communicates the generator and line signals with the STCA board via the JE connector.

TCQC Connectors

2PL – Distributes power from the TCPS board in the <R1>, <R2> and <R3> cores.

8PL – I/O connector to the STCA boards in cores <R1>, <R2>, and <R3>. Signals include the COM1 RS232 output signals, the serial I/O signals, the acand DC power monitoring signals (TCPD), and a pulse rate magnetic pick up signal.

19PL – I/O connector to the STCA board. The I/O signals may include the megawatt, generator, bus, compressor stall detection signals, and the magnetic pick up pulse rate signals from the high pressure shaft. Power bus and neutral bus signals may also be carried in this connector (TCPS). Cores <R2> and <R3> may use the 19PL connector for other signals.

JC – Connected to the power supply board TCPS whose signals pass through the TCQC board to the TCQA board via the JE connector and to the STCA board via the 19PL connector.

JE – Writes the power supply monitoring signals to the TCQA board and reads the servo valve outputs and generator and line signals from the TCQA board.

JFF – Writes the servo outputs to the QTBA terminal board.

JGG – Writes the servo outputs and the 15 amp signals, reads magnetic pick up and megawatt transducer signals to/from the QTBA terminal board.

JH – Reads the pulse rate signal and compressor stall signals from the TBQB terminal board.

JJ – Reads the speed signals from the TCQE board in the <R1> core which originated on the PTBA terminal board in the <P1> core.

JX – Connector that terminates the IONET signal from TCEA board in the <P1> core. Used only in the <R1> core.

1PL – Typically not used.

6PL – Typically not used.

17PL – Typically not used.

VARC – Typically not used.

JBU – Typically not used.

ARCPL – Typically not used.

CARC – Typically not used.

The hardware document in Appendix B and the signal flow diagrams in Appendix D contain more information.

TCQC Configuration

Hardware. The first 16 hardware jumpers on the TCQC board configure the output current range for the servo outputs. The even numbered jumpers select the feedback scaling, while the odd numbered jumpers select the source output resistance. Hardware jumpers 25 through 36 are for added feedback scaling options for servos one through four, giving them a maximum current range of +/- 240 mA. BJ17 sets the RS232 port for card tests. BJ21 is the stall timer enable. BJ22 is the oscillator enable for factory test. BJ23 and BJ24 are not used. BJ18 and BJ20 limit the P15 and N15 supply to the proximity transducers. Hardware jumpers JP38 and JP39 set the magnetic pick up gain for liquid fuel flow signals in some applications. Refer to Appendix A and the paragraphs below for information on the hardware jumper settings for this board.

Software. There is no software configuration for the TCQC board.

TCQC Servo Valve Regulator Output Circuits

Current from the TCQA board is scaled by the TCQC board jumpers and sent to position the servo valves. Hardware jumpers on the TCQC board are used to configure the reference feedback and output current range. The TCQC board contains the servo clamp relay and the suicide relays. Energizing the suicide relays drives the signal to ground by passing the servo valves. This allows the servo valve to drift to the bias position. Energizing the servo clamp relays applies a positive current to the servo valve. A signal from the CSP that is written to the TCQA board and then sent to the TCQC board will energize the suicide relays. An emergency signal that is written directly to the TCQC board via the TCEA board will energize the servo clamp relays.

TCQC Pulse Rate Input Circuit

The high pressure shaft pulse rate signals are read from the TCQE board via the JJ connector. The TCQE board signals originate on the PTBA board in the <P1> core. The high pressure shaft signals are written to the TCQA board via the JE connector to be scaled and conditioned and then are written to the STCA board via 3PL. The pulse rate inputs from both the magnetic speed sensors and the TTL type sensors that are landed on the TBQB terminal board pass through the TCQC board via the JH connector. Additional magnetic pick up pulse rate signals are available on the QTBA board and are read by the JGG connector. Some of the signals landed on the PTBA terminal board could be landed on the QTBA terminal board and should not be used on both. The corresponding screws on the QTBA terminal board are not available if the signals are also landed on the PTBA terminal board.

TCQC Generator And Line Feedback

The signals for generator and line feedback pass through the TCQC board where they are scaled and conditioned prior to being written to the STCA board via the 19PL connector. These signals originate on the TCTG board in the <P1> core, pass through the TCQA board and are written to the TCQC board via the JE connector. The STCA board uses these signals for the synch check function.

TCQC IONET Circuit

The termination of the IONET for the <R1> core is on the TCQC board in <R1>. The signals from the TCDA board in the <Q11> core and the <X>, <Y>, and <Z> boards in the <P1> core are daisy chained on the IONET via the JX connector. These signals are written directly to the STCA board via the 8PL connector.

TCQC LVDT/LVDR Excitation Circuit

The TCQC board excites the LVDT/R's via the QTBA terminal board over the JFF connector at 3.2 Khz and 7 V rms.

TCQC 4–20 mA Input Circuits

The TCQC board provides the circuitry for two mA input signals. The first mA input signal is read from the TBQB terminal board via the JH connector. This signal is typically the compressor stall detection signal. The second mA input signal is read from the QTBA terminal board via the JGG connector. This signal is typically the megawatt transducer signal. These signals are written to the STCA board over the 19PL connector.

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