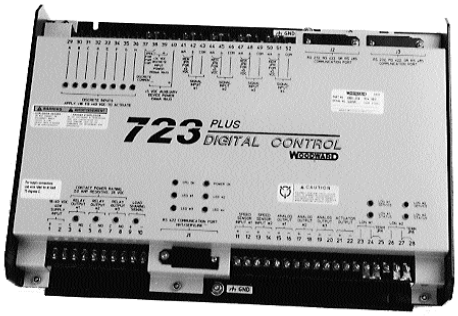
WOODWARD

Product Specification
14085

723CAM™
3-D Cam Positioning For Hydro Turbines



APPLICATIONS

The 723CAM™ (3-D Cam Blade Positioner) package utilizes Woodward's 723PLUS control, a robust digital hardware platform. Using a standard field configurable software package, the 723CAM package provides automatic blade positioning for Hydro turbines, based on nethead, gate, and blade position (For more information on the 723PLUS hardware platform, reference product specification 02759.)

DESCRIPTION

The 723CAM package is a 3-D Cam (curve) blade control designed for a single blade actuator. It can be configured to perform several site-specific functions dependent upon the application.

The control has many operating modes and preset blade position setpoints (start tilt, shutdown tilt, and blade lock). The Operating Mode defines what control setpoint is operating the blades, and which control inputs will be used. Preset Blade Position Setpoints are not Operating Modes, but blade position selections (via contact input) that can be used within a given Operating Mode. For example, the blades are in the On-cam Operating Mode with a setpoint of 50% when the discrete input tilt #2 is closed. The setpoint is instantly stepped to 85%, the Tilt #2 preset position.

FLEXIBILITY

The 723CAM system is field configurable, allowing site engineers to configure the control to their specific application, and to make future control configuration changes. On-line tunables are available to allow set point adjustments while a unit is running. Inputs and outputs are programmable as required by the application or interface. Additional outputs from LinkNet® modules (8 total) are also available to provide speed, gate position, or blade position switches.

CALIBRATION MODE

This version of the 723CAM system has a built in calibration mode. The calibration mode will decrease the setup/ calibration time and decrease the amount of time spent troubleshooting problems. The primary functions of the calibration mode are as follows:

• Bias servo control valve in the open/closing directions. This is primarily used to calibrate the servo feedback and diagnose proportional valve problems.

• Step the servo between two independent setpoints. This is primarily used for gate timing or maintenance situations.

• Input setpoint step values. This is primarily used to test the hydraulic valve response.

• Independent control of all output I/O points. This is used to verify field wiring and tune analog indicators.

• Monitoring of all input I/O points. This is used to verify all input signals to the control.

- 3-D Cam Blade Positioning
- Manual Blade Positioning
- Optional Functions
- 32-Bit Microprocessor Based Digital Control
- Field-Configurable
- User-Friendly Menu Format
- View Program and Change Dynamics While Running
- ModBus® Communications
- Calibration Mode

CONTROL SPECIFICATIONS

INPUTS

Power

Low Voltage Model ..... 18-40 Vdc (24 or 32 Vdc nominal)
High Voltage Model ..... 90-150 Vdc (125 Vdc nominal)
Power Consumption ..... 40 W nominal
Inrush Current ..... (LV) 7 A for 0.1 ms
Inrush Current ..... (HV) 22 A for 15 ms

Discrete Inputs ..... 8 contact inputs (7 dedicated, 1 configurable)
Analog Inputs ..... 4 (4-20 mA) (2 dedicated, 2 configurable)

OUTPUTS

Valve/Actuator Drivers ..... 2 actuator outputs (4-20 mA or 20-160 mA)
Discrete Outputs ..... 3 relay outputs, 5 A at 28 Vdc, resistive/0.5 A at 115 Vac, resistive, (1 dedicated, 2 configurable)
Analog Outputs /Actuator Outputs ..... 2(0-1mA) (2 dedicated, 2 configurable) 2(0-20 mA)
..... (2 dedicated, 2 configurable)

COMMUNICATION ..... 2 Modbus® (ASCII or RTU) Comm Ports (RS232, RS422, or RS485 compatible)
..... LonWorks®

DIMENSIONS

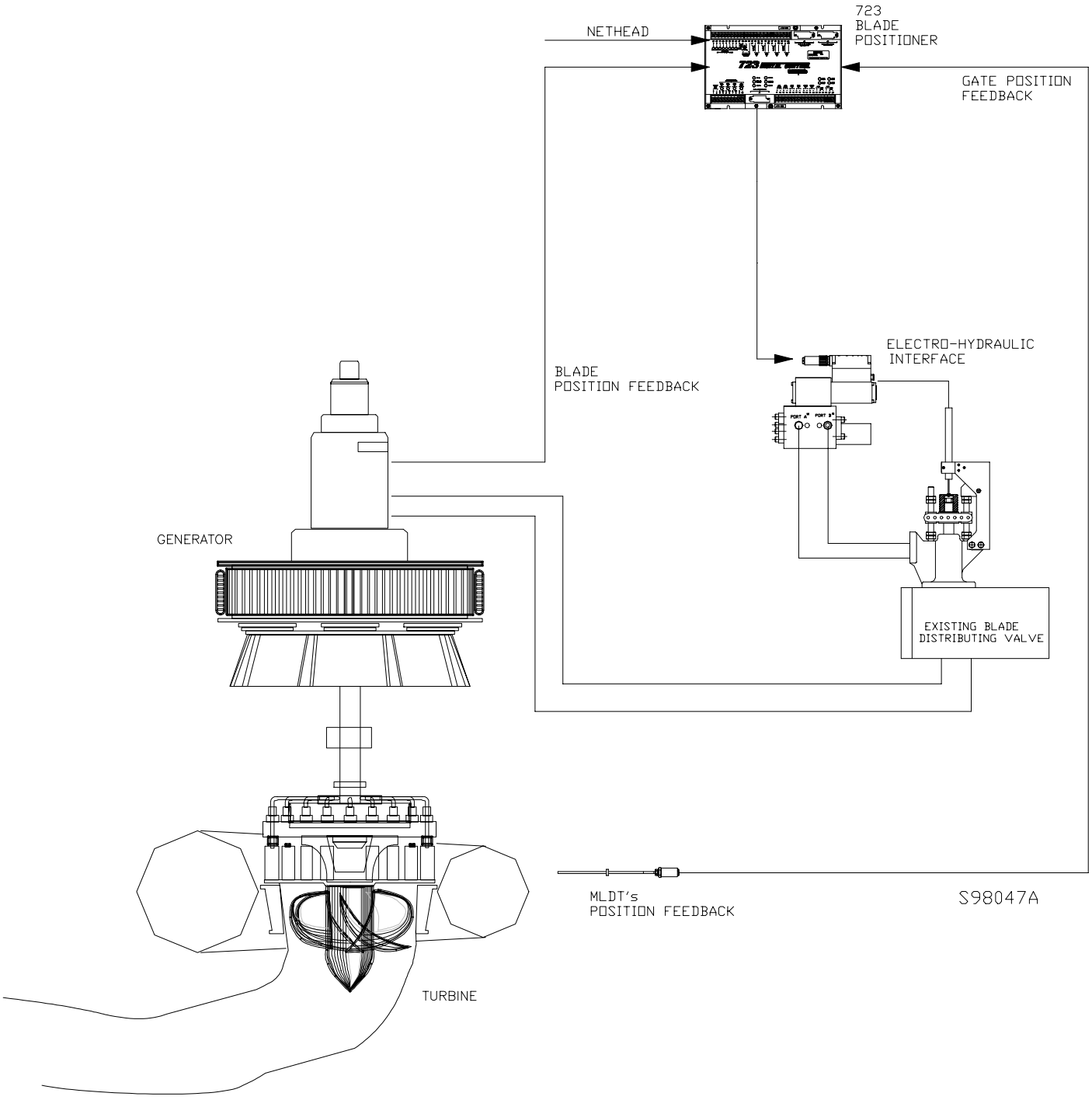
..... 416 (length) x 286 (height) x 56 (depth) mm (16.7 x 11.25 x 2.2 in)

FUNCTIONALITY

• 3-D cam for Kaplan; • Blade positioning and indication; • Alarm output; • Hardware status LEDs.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature ..... -40 to +70 °C (-40 to +158 °F)
Storage Temperature ..... -55 to +105 °C (-67 to +221 °F)
Humidity ..... 95% at +20 to +55 °C (+68 to +131 °F)
..... Lloyd's Register of Shipping Specification Humidity Test
Mechanical Vibration ..... Lloyd's Register of Shipping Specification Vibration Test
Mechanical Shock ..... US MIL-STD 801C Method 516.2, Proc. I, II, V
EMI/RFI Specification ..... Lloyd's Register of Shipping Specification
..... EN 50081-2 and EN 50082-2



Typical Kaplan Unit (Retrofit)

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Discrete Inputs (8)

2 Discrete inputs for blade raise/lower commands.
1 Discrete input for On/Off 3-D cam
1 Discrete input for shutdown blade tilt
1 Discrete input for start blade tilt
1 Discrete input for "Reset"
1 Discrete input for Blade Lock
1 Discrete input for manual nethead control

Analog Inputs (4)

2 Analog inputs for position feedback.

Configurable
2 Analog inputs for head/tail level or nethead

Discrete Outputs (3)

Configurable
1 Contact output for general alarm
2 Contact outputs for gate position or blade position switches
(8 additional gate position or 8 additional blade position switches available with LinkNet® Module option)

Analog Outputs (4)

1 Analog output for proportional valve control (4-20 mA)

Configurable
3 Analog outputs for gate/blade position indication or nethead indication.

Modbus(1)

Modbus is currently configured for control and telemetry. The 723CAM is configured and intended to be used as a Modbus slave only. The following telemetry points are available:

All I/O points.

Servo Position Setpoints.

Servo Feedback.

Additional Woodward Hardware Required

Additional hardware is required when the 723PLUS is used as a 3-CAM digital replacement.

Typical hardware for Mod 1, Mod 2, 3-D cam replacement includes:

1 Woodward Proportional valve for existing pilot valve

1 Feedback Device for electronic blade restoring

1 Signal conditioner for Gate Feedback Potentiometer

For more information contact:

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