



Product Manual 85018V1
(Revision E, 10/2012)
Original Instructions



505E Digital Governor
for Extraction Steam Turbines

Volume 1

Manual 85018 consists of 2 volumes (85018V1 & 85018V2).

Installation and Operation Manual

Chapter 1.

General Information

Introduction

This manual (85018) describes the Woodward 505E Digital Governor for steam turbines with controlled extraction and/or admission pressure control. English versions are 9907-165, 9907-166, and 9907-167. The option charts below show the differences between the part numbers. Volume 1 of this manual provides installation instructions, describes the control, and explains the configuration (programming) and operating procedures. Volume 2 includes notes on applying the control to specific applications, Service mode information, and 505E hardware specifications.

This manual does not contain instructions for the operation of the complete turbine system. For turbine or plant operating instructions, contact the plant-equipment manufacturer.

Manual 85017 describes the 505 Digital Governor for steam turbines without extraction pressure control.

Part Number Options

Part Number	Power
9907-165	HVAC (180–264 Vac)
9907-166	AC/DC (88–132 Vac) or (90–150 Vdc)
9907-167	LVDC (18–32 Vdc)
Optional Bulkhead Mounting Box (NEMA 4X) P/N 8923-439	

505 controllers now utilize a special polyacrylate conformal coating material to coat and protect their internal circuit boards from corrosive environments. This new polyacrylate material replaces the previous silicon conformal coating and provides an improved barrier between board components and sulfur-based gases. 505 controls that have this coating will have a label on the side stating "SULFUR RESISTANT CONFORMAL COATED". All 505 controllers shipped from Woodward with the revision letters listed below, or subsequent letters, were shipped with the new polyacrylate conformal coating material:

Table 1-1. 505s with Polyacrylate Coated Boards

Part Number	Revision	Label on 505
9907-165	V	9907-165V
9907-166	V	9907-166V
9907-167	T	9907-167T

Chapter 2. Installation Procedures

Introduction

This chapter provides instructions on how to mount and connect the 505E into a system. Hardware dimensions, ratings, and jumper configurations are given to allow a customer to mount, wire, and configure the 505E package to a specific application.

Electrical ratings, wiring requirements, and options, are provided to allow a customer to fully install the 505E into a new or existing application.

Mechanical Data and Hardware Installation

If so labeled on the enclosure, the 505E is UL/CUL listed for use in hazardous locations in UL file E156028. This Equipment is suitable for use in Class I, Division 2, Groups A, B, C, and D (Class I, Zone 2, Group IIC) or non-hazardous locations only.

This equipment is suitable for use in European Zone 2, Group II environments per compliance with EN60079-15, Electrical apparatus for explosive atmospheres – Type of protection 'n'

These listings are limited only to those units bearing the certification identification.

Field wiring must be stranded copper wire rated at least 75 °C for operating ambient temperatures expected to exceed 50 °C.

Wiring must be in accordance with North American Class I, Division 2 or European Zone 2 wiring methods as applicable, and in accordance with the authority having jurisdiction.

Peripheral equipment must be suitable for the location in which it is used.



WARNING

EXPLOSION HAZARD—Do not connect or disconnect while circuit is live unless area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division or Zone applications.

Do not use any test points on the power supply or control boards unless the area is known to be non-hazardous.



AVERTISSEMENT

RISQUE D'EXPLOSION—Ne pas raccorder ni débrancher tant que l'installation est sous tension, sauf en cas l'ambiance est décidément non dangereuse.

La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, applications Division ou Zone.

Ne pas utiliser les bornes d'essai du block d'alimentation ou des cartes de commande à moins de se trouver dans un emplacement non dangereux.

505E Digital Governor**Manual 85018V1****Enclosures**

Figure 2-1 shows 505E control layout and mounting pattern. The 505E digital control is housed in a flush mount enclosure. This enclosure is designed for installation within a control room panel or cabinet and, by itself, cannot be bulkhead-mounted. The 505E package, when properly installed within a NEMA 4 or IP56 panel or cabinet meets NEMA 4X or IP56 ratings respectively. A gasket is attached to the rear side of the package's bezel to properly seal the 505E's face-plate to a panel. All field wiring connects to the 505E through removable terminal blocks located on the 505E's back side.

The 505E's internal components are industrial grade. These components include the CPU (central processing unit), its memory, the switching power supply, all relays, all Input/ Output circuitry, and all circuitry for the front panel display, touch keypad, and the serial communications.

An optional NEMA-4X enclosure is available to allow the 505E to be bulkhead mounted (Figure 2-2). The 505E digital control mounts on the front door of the optional enclosure. This allows for easy service access through the enclosure's front door. This bulkhead mounted enclosure has two removable gland plates attached to the bottom. A user may cut appropriately sized conduit openings (up to 1.5"/38 mm) as required, in the removable gland plates for wiring access. For EMI reasons, it is recommend that all low-current wire (terminals 52 through 121) be separated from all high-current wire (terminals 1 through 51).

Mounting

The standard 505E package must be mounted to allow sufficient room for wiring access. Eight front panel screws permit secure mounting. The standard 505E weighs approximately 4 kg (9 lb), and has an operating range of -25 to $+65$ °C (18 to 149 °F) ambient air temperature.

The optional enclosure permits the control to be bulkhead mounted. See Figure 2-2 for mounting dimensions. This enclosure weighs approximately 10 kg (22 lb) and allows an operating range of -20 to $+60$ °C (-4 to $+140$ °F) ambient air temperature.

505E Hardware Jumpers

To allow the 505E the flexibility of interfacing with different types of speed probes, transducers, and communication cables, user changeable jumpers are used. These jumpers are accessed by taking the 505E's back cover off and are located on the I/O module. Refer to Table 2-1 for jumper options and Figure 2-4 for jumper locations. Each set of jumpers are used to select between two or three interface options for one circuit (see Figure 2-3). Of the three position jumper options provided only one interface option at a time can be selected. Power should be removed before the jumpers are accessed, and proper ESD precautions should be taken before any contact is made with any part of the circuit board.

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505E Digital Governor

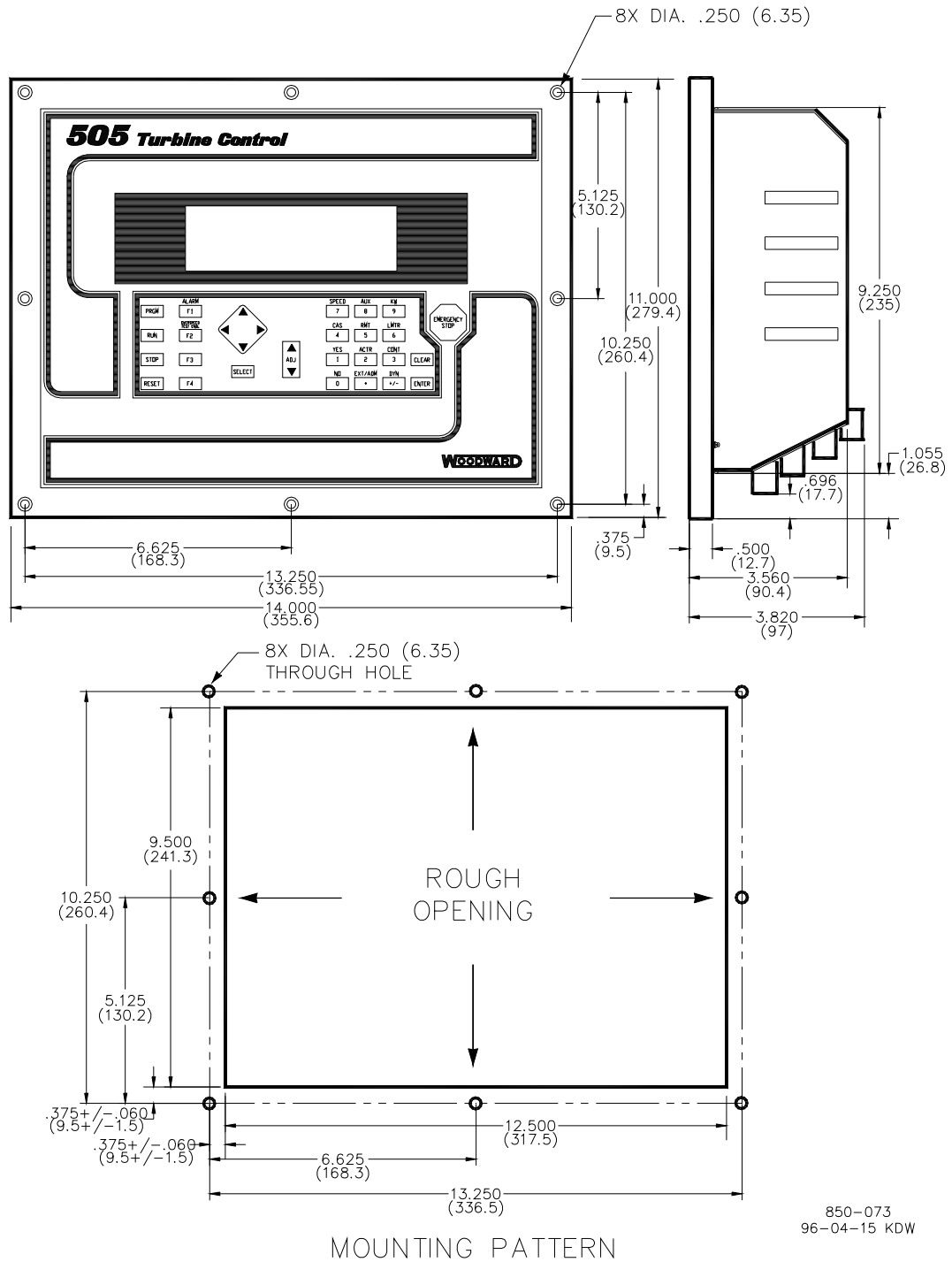


Figure 2-1. 505E Control Layout (Standard Enclosure)

505E Digital Governor

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Function	Jumpers
SPEED SENSOR #1—MPU	JPR7, JPR21 *
SPEED SENSOR #1—PROX. PROBE	JPR6, JPR20
SPEED SENSOR #2—MPU	JPR5, JPR19 *
SPEED SENSOR #2—PROX. PROBE	JPR4, JPR18
EXT/ADM INPUT—LOOP POWERED- (2 WIRE)	JPR10
EXT/ADM INPUT—SELF-POWERED	JPR11 *
ANALOG INPUT #2—LOOP POWERED- (2 WIRE)	JPR8
ANALOG INPUT #2—SELF-POWERED	JPR9 *
ANALOG INPUT #3—LOOP POWERED- (2 WIRE)	JPR14
ANALOG INPUT #3—SELF-POWERED	JPR15 *
ANALOG INPUT #4—LOOP POWERED- (2 WIRE)	JPR12
ANALOG INPUT #4—SELF-POWERED	JPR13 *
ANALOG INPUT #5—LOOP POWERED- (2 WIRE)	JPR16
ANALOG INPUT #5—SELF-POWERED	JPR17 *
COMM PORT #1 NO TERMINATIONS	JPR23, JPR26 *
COMM PORT #1 RS485/RS422 RECEIVE TERMINATION	JPR22, JPR25
COMM PORT #1 RS422 TRANSMIT TERMINATION	JPR24, JPR27
COMM PORT #2 NO TERMINATIONS	JPR29, JPR32 *
COMM PORT #2 RS485/RS422 RECEIVE TERMINATION	JPR28, JPR31
COMM PORT #2 RS422 TRANSMIT TERMINATION	JPR30, JPR33
* = DEFAULT	

Table 2-1. Jumper Options Chart

Electrical Connections



EXPLOSION HAZARD—Do not connect or disconnect while circuit is live unless area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division 2.



RISQUE D'EXPLOSION—Ne pas raccorder ni débrancher tant que l'installation est sous tension, sauf en cas l'ambiance est décidément non dangereuse.

La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.

NOTICE

Do not connect any cable grounds to “instrument ground”, “control ground”, or any non-earth ground system. Make all required electrical connections based on the wiring diagrams shown in this section.

Refer to Figure 2-7 for a representative 505E I/O interface schematic, and Volume 2 of this manual, for hardware Input/Output specifications.

All inputs and outputs to the 505E are made through “CageClamp” terminal blocks on the bottom of the 505E package. For EMI reasons, it is recommend that all low-current wire (terminals 52 through 121) be separated from all high-current wire (terminals 1 through 51).

The terminal blocks are screwless CageClamp style blocks. The spring clamp can be actuated by using a standard 3 mm or 1/8” flat bladed screwdriver or a snap-on thumb lever (Figure 2-5). Two snap-on thumb levers are provided with the 505E unit. The 505E terminal blocks accept wires from 0.08–2.5 mm² (27–12 AWG) wire. Two 18 AWG or three 20 AWG wires can be easily installed in each terminal.



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PRODUCT: 9907-167 / 505E LVDC Extraction/Admission Steam-Turbine Governor

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