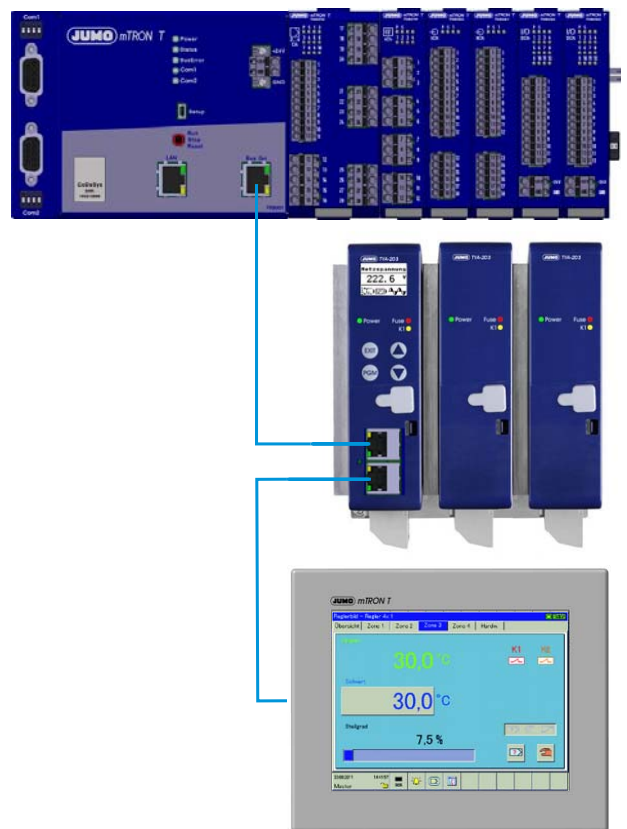


JUMO mTRON T

Measuring, Control, and Automation System Thyristor Power Controller JUMO TYA 20x



Operating Manual



70500153T90Z001K000

V2.00/EN/00657327

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Contents

1.1 Available technical documentation

The documents specified below are available for the measuring, control, and automation system (previous document number in parentheses).

1.1.1 General information

| Product | Type of documentation | No. | Printed | PDF file |
|---|---------------------------------|--------------------------------|---------|----------|
| Measuring, control, and automation system | Data sheet | 70500000T10... | - | X |
| | System manual ¹ | 70500000T90... (B 705000.0) | X | - |
| | Setup program manual | 70500000T96... (B 705000.6) | - | X |
| | System description ² | 70500000T98... (B 705000.8) | - | X |

¹ Accessory subject to charge

² Includes an overview of the purpose and content of all documents

1.1.2 Base units

| Product | Type of documentation | No. | Printed | PDF file |
|-------------------------|---|----------------------------------|---------|----------|
| Central processing unit | Data sheet | 70500100T10... | - | X |
| | Operating manual | 70500100T90... (B 705001.0) | - | X |
| | Modbus interface description | 70500100T92... (B 705001.2.0) | - | X |
| | PROFIBUS-DP interface description | 70500103T92... (B 705001.2.3) | - | X |
| | digiLine interface description | 70500106T92... | - | X |
| | Installation instructions | 70500100T94... (B 705001.4) | X | X |
| | CODESYS OPC server operating manual | 70500151T90... (B 705001.5.1) | - | X |
| | Process engineering application operating manual | 70500152T90... | - | X |
| | Operating manual Thyristor power controller (type 70906x; integration in the measuring, control, and automation system) | 70500153T90... | - | X |

1 Introduction

1.1.3 Input/output modules

| Product | Type of documentation | No. | Printed | PDF file |
|--|---------------------------|--------------------------------|---------|----------|
| Multichannel controller module | Data sheet | 70501000T10... | - | X |
| | Operating manual | 70501000T90... (B 705010.0) | - | X |
| | Installation instructions | 70501000T94... (B 705010.4) | X | X |
| Relay module 4-channel | Data sheet | 70501500T10... | - | X |
| | Operating manual | 70501500T90... (B 705015.0) | - | X |
| | Installation instructions | 70501500T94... (B 705015.4) | X | X |
| Analog input module 4-channel | Data sheet | 70502000T10... | - | X |
| | Operating manual | 70502000T90... (B 705020.0) | - | X |
| | Installation instructions | 70502000T94... (B 705020.4) | X | X |
| Analog input module 8-channel | Data sheet | 70502100T10... | - | X |
| | Operating manual | 70502100T90... (B 705021.0) | - | X |
| | Installation instructions | 70502100T94... (B 705021.4) | X | X |
| Analog output module 4-channel | Data sheet | 70502500T10... | - | X |
| | Operating manual | 70502500T90... | - | X |
| | Installation instructions | 70502500T94... | X | X |
| Digital input/output module 12-channel | Data sheet | 70503000T10... | - | X |
| | Operating manual | 70503000T90... (B 705030.0) | - | X |
| | Installation instructions | 70503000T94... (B 705030.4) | X | X |

1.1.4 Special modules

| Product | Type of documentation | No. | Printed | PDF file |
|---------------|---------------------------|--------------------------------|---------|----------|
| Router module | Data sheet | 70504000T10... | - | X |
| | Installation instructions | 70504000T94... (B 705040.4) | X | X |

1.1.5 Operating, visualization, recording

| Product | Type of documentation | No. | Printed | PDF file |
|-------------------------|------------------------------|----------------------------------|---------|----------|
| Multifunction panel 840 | Data sheet | 70506000T10... | - | X |
| | Operating manual | 70506000T90... (B 705060.0) | - | X |
| | Modbus interface description | 70506000T92... (B 705060.2.0) | - | X |
| | Installation instructions | 70506000T94... (B 705060.4) | X | X |
| Operating panels | Data sheet | 70506500T10... | - | X |

1.1.6 Power supply units

| Product | Type of documentation | No. | Printed | PDF file |
|-------------------------|---------------------------------|----------------|---------|----------|
| 24 V power supply units | Data sheet | 70509000T10... | - | X |
| | Operating instructions QS5.241 | | X | - |
| | Operating instructions QS10.241 | | X | - |

1 Introduction

1.2 Operating manuals of the power controller

The documents listed below are available for power controller type 70906x and they are of importance for the integration of the power controller in the measurement, control and automation system.

| Product | Type of documentation | No. | Printed | PDF file |
|--|----------------------------------|--------------------------------|----------------|-----------------|
| Thyristor power controller type 70906x | Operating manual for type 709061 | 70906100T90... (B 709061.0) | X | X |
| | Operating manual for type 709062 | 70906200T90... (B 709062.0) | X | X |
| | Operating manual for type 709063 | 70906300T90... (B 709063.0) | X | X |

1.3 Safety information

1.3.1 Warning symbols



DANGER!

This symbol indicates that **personal injury caused by electrical shock** may occur if the respective precautionary measures are not carried out.



WARNING!

This symbol in connection with the signal word indicates that personal injury may occur if the respective precautionary measures are not carried out.



CAUTION!

This symbol in connection with the signal word indicates that **damage to assets or data loss** will occur if the respective precautionary measures are not taken.



CAUTION!

This symbol indicates that **components could be destroyed** by electrostatic discharge (ESD = Electro Static Discharge) if the respective cautionary measures are not taken. Only use the ESD packages intended for this purpose to return device inserts, assembly groups, or assembly components.



READ DOCUMENTATION!

This symbol – placed on the device – indicates that the associated **device documentation has to be observed**. This is necessary to recognize the kind of the potential hazards as well as the measures to avoid them.

1.3.2 Note signs



TIP!

This symbol refers to **important information** about the product, its handling, or additional use.



REFERENCE!

This symbol refers to **further information** in other sections, chapters, or manuals.



FURTHER INFORMATION!

This symbol is used in the tables and refers to **further information** in connection with the table.



DISPOSAL!

This device and the batteries (if installed) must not be disposed in the garbage can after use! Please ensure that they are disposed properly and in an **environmentally friendly manner**.

1 Introduction

1.3.3 Intended use

The measuring, control, and automation system is intended for use in an industrial environment, as specified in the technical data of the individual system modules. Other uses beyond those defined are not viewed as intended uses.

The modules are manufactured in compliance with the relevant standards and directives as well as the applicable safety regulations. Nevertheless, incorrect use may lead to bodily injury or property damage.

To avoid dangers, the modules may only be used:

- For the intended use
- When in good order and condition
- When taking into account the technical documentation provided

Even if a module is used correctly and according to the intended use, it may still pose application-related dangers, for example as the result of missing safety devices or incorrect settings.

To avoid incorrect settings, this manual contains relevant safety information and warnings. These must be complied with.

1.3.4 Qualification of personnel

This document contains the information required to ensure that the measuring, control, and automation system described is used as intended.

It is intended for technically qualified personnel who have received special training and have the appropriate knowledge in the field of automation technology (measuring and control technology).

Understanding and technically correct observance of the safety information and warnings contained in the supplied technical documentation are prerequisites for safe startup as well as safety during operation. Only qualified personnel have the required specialist knowledge to correctly interpret and implement the safety information and warnings contained in this document in specific situations.

1.4 System requirements

System version (device software)

The integration of power controllers of type 70906x is supported by the measuring, control, and automation system from system version 04 onwards.

The system version is determined using the compatibility index of the base unit (central processing unit). Further information on the compatibility index:

⇒ Setup program manual

Hardware

The necessary device software can be installed on a central processing unit as of hardware version 278.02.xx and higher.

1.5 Content of this document

Power controllers of type 70906x can be integrated as modules in the measuring, control, and automation system via the system bus (via network cable). Each power controller is counted as an input/output module (max. 30 modules per system).

This document describes the connection to the system bus and the configuration, provided it must be performed within the measuring, control, and automation system.

The mounting, electrical connection, configuration, and operation of the power controller are described in the operating manual of the respective power controller. The technical data of the individual devices is also listed there.

1 Introduction

2.1 Installation notes

**NOTE!**

These installation notes apply for the entire measuring, control, and automation system and, on some occasions, are only applicable for a specific module.

The respective connection diagram shows the context.

Requirements for the personnel

- Work on the modules must only be carried out to the extent described and, like the electrical connection, only by qualified personnel.
- Before plugging and unplugging connection cables ensure that the person performing the work is electrostatically discharged (e.g. by touching grounded metallic parts).

Cables, shielding, and grounding

- When selecting the cable material, when installing, and when performing the electrical connection of the module, the regulations of DIN VDE 0100 "Erection of power installations with rated voltages up to 1000 V" and the respective national regulations (e.g. on the basis of IEC 60364) are to be observed.
- Certain cables must be heat resistant up to at least 80 °C at maximum load. The relevant instructions in the connection diagram of the affected modules must be observed.
- Route input, output, and supply cables separately and not parallel to one another.
- Only use shielded and twisted probe and interface cables. Do not route the lines close to current-carrying components or cables.
- For temperature probes, ground the shielding on one side in the control cabinet.
- Do not perform loophroughs on the grounding cables, but route the cables individually to a shared grounding point in the control cabinet; in doing so, ensure that the cables are as short as possible.
Ensure that the equipotential bonding is correct.

Electrical safety

- Isolate power supply units from the voltage supply on the primary side if there is a risk of touching parts with dangerous electrical voltage (e.g. 230 V) in the course of work.
- The fuse rating of the power supply units on the primary side should not exceed a value of 10 A (inert).
- With modules with relay or solid state relay outputs, the load circuits can be operated with a dangerous electrical voltage (e.g. 230 V). Disconnect load circuits from the voltage supply during installation/dismounting and electrical connection.
- In order to prevent the destruction of the relay or solid state relay outputs in the event of an external short circuit in the load circuit, the load circuit should be fused to the maximum admissible output current.
- The modules are not suitable for installation in areas with an explosion hazard.
- In addition to a faulty installation, incorrectly set values on the module could also impair the correct function of the following process. Therefore, ensure that safety devices independent of the module (e.g. overpressure valves or temperature limiters/monitors) are available and that it is only possible for qualified personnel to define settings. Please observe the corresponding safety regulations in this context.

2 Connection

References to other information

- The electromagnetic compatibility meets the standards and regulations cited in the technical data.
- The USB device interface and voltage supply in the central processing unit 705001 are **not** electrically isolated. In general, please observe the specifications regarding electrical isolation.

2.2 System bus

To integrate the power controller into the measuring, control, and automation system, it must be equipped with a system bus interface (order code: 84).

The connection must be established with a commercially available network cable (patch or crossover cable) that corresponds to at least category 5 and has S/FTP shielding.

Interface on the power controller



IN System bus In

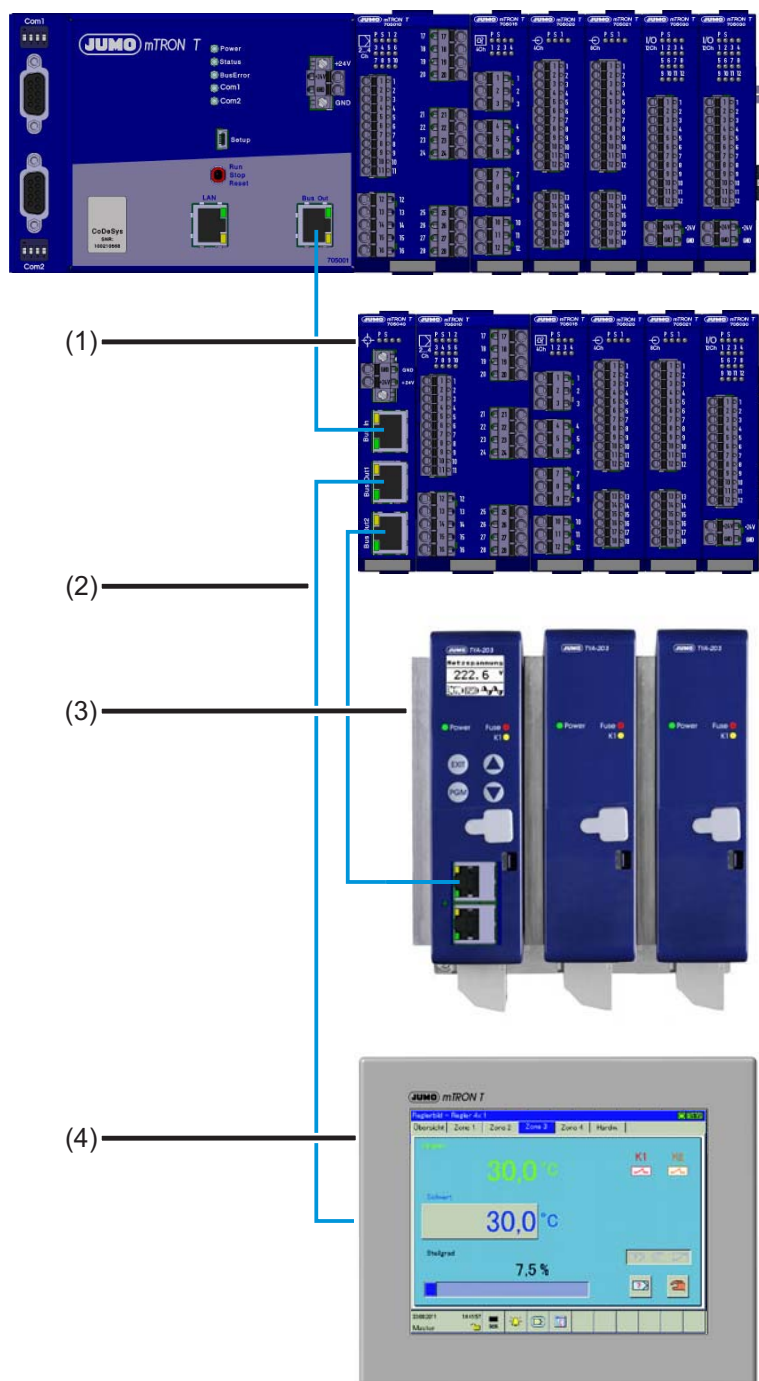
OUT System bus Out

Connection to the system bus

The power controller is connected to the central processing unit, the multifunction panel, or a router module. Another power controller, a multifunction panel, or a router module can, in turn, be connected to the power controller.

The following figure shows an example connection between a central processing unit, a router module, a multifunction panel, and a power controller. The power controller is connected to the second system bus output of the router module.

2 Connection



- (1) Router module with downstream modules
- (2) Network cable (patch or crossover cable), at least CAT5 (S/FTP); distance per connection up to 100 m
- (3) Power controller
- (4) Multifunction panel

2 Connection

3.1 General information

The power controller is integrated into the system hardware arrangement with the setup program of the measuring, control, and automation system. The connections within the system are configured using the setup program or the multifunction panel.

The NV connecting list of the power controller is used to link external inputs (NV_...) of the power controller to signals from other modules via the system bus.

The power controller signals are, in turn, available for configuring the other modules.

The following chapters provide detailed lists with the signals of all modules (including the power controller):

⇒ Chapter 3.4 "Analog signals (overview)", page 21

⇒ Chapter 3.5 "Digital signals (overview)", page 25

Further information about the signals can be found in the operating manual for the relevant module.

**NOTE!**

There is no NV connecting list in the input/output module configuration menus on the multifunction panel. Instead, a central NV connecting list is available in the configuration menu of the base unit (CPU).

**NOTE!**

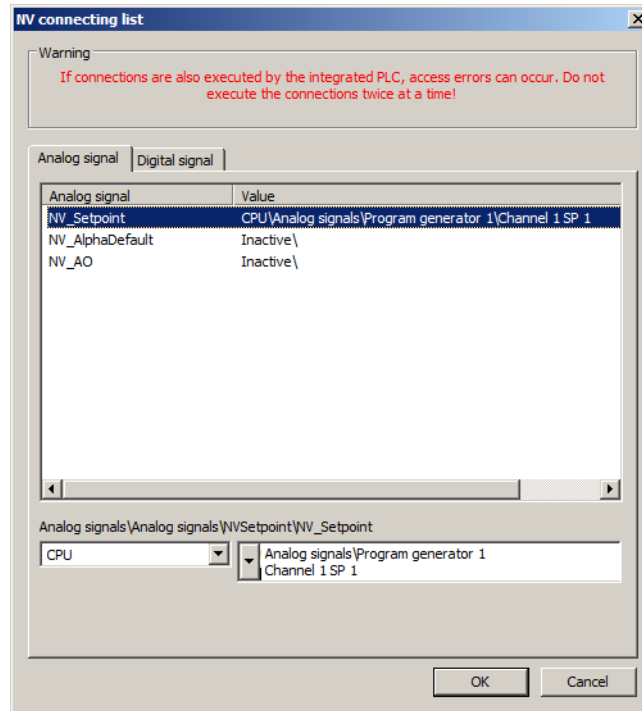
While the power controller is configured, the measuring, control, and automation system cannot switch to the RUN system status.

While the measuring, control, and automation system is in the RUN system status, the power controller cannot be configured using the keypad or the setup program (the operating level is still accessible).

3 Configuration

3.2 NV connecting list – analog signals

Setup dialog



Parameters

| Parameter | Selection/settings | Description |
|---------------------------|--|--|
| Analog signal – value | List of the external analog inputs of the power controller If a connection has already been configured, the module to which the external input of the power controller is connected and its signal are displayed in the "Value" column. | |
| | NV_Setpoint NV_AlphaDefault NV_AO Select external input to be connected. | Input setpoint Alpha specification value (phase control angle) for logic operation (switch) with alpha specification via interface Analog output |
| ...\NV_Setpoint (Example) | This is the previously selected external input. Inactive Select the module and – in the selector next to it on the right – the signal to connect to the external input. | No connection List of modules in the system and the relevant signals In this example, the external input NV_Setpoint of the power controller is connected to an output of the program generator 1. |

Status after change of configuration

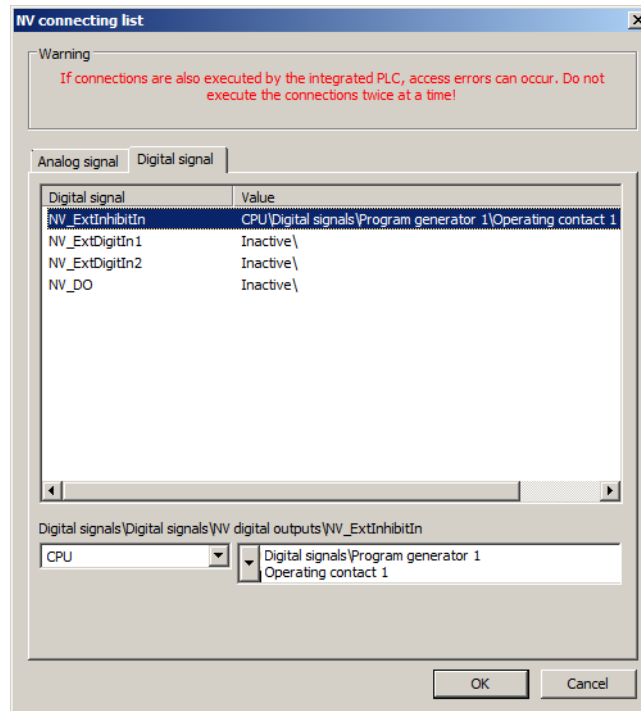
The connections are available immediately.

Behavior after power on

The connections are available immediately after system initialization.

3.3 NV connecting list – digital signals

Setup dialog



Parameters

| Parameter | Selection/settings | Description |
|---------------------------------|---|--|
| Digital signal – value | List of the external digital inputs of the power controller If a connection has already been configured, the module to which the external input of the power controller is connected and its signal are displayed in the "Value" column. | |
| | NV_ExtInhibitIn NV_ExtDigitIn1 NV_ExtDigitIn2 NV_DO Select external input to be connected. | External inhibit input (firing pulse inhibit) External digital input 1 External digital input 2 Digital output |
| ...NV_ExtInhibitIn (Example) | This is the previously selected external input. Inactive Select the module and – in the selector next to it on the right – the signal to connect to the external input. | No connection List of modules in the system and the relevant signals In this example, the external input NV_ExtInhibitIn of the power controller is connected to an output of the program generator 1. |

3 Configuration

Status after change of configuration

The connections are available immediately.

Behavior after power on

The connections are available immediately after system initialization.

3.4 Analog signals (overview)

The following table contains all signals that are available in the NV connecting list for connection to the external inputs (NV_...) of the power controller.

| Category | Signal | Description |
|--|------------------------------------|--|
| Inactive | | No signal selected |
| Central processing unit | | |
| Analog variables | Analog variable 1 to 64 | Analog variable 1 to 64 (via interface) |
| Program generator 1 to Program generator 9 | Channel 1 SP1 to Channel 3 SP1 | Setpoint value 1 of program channel 1 to 3 |
| | Channel 1 SP2 to Channel 3 SP2 | Setpoint value 2 of program channel 1 to 3 |
| | Channel 1 SP3 to Channel 3 SP3 | Setpoint value 3 of program channel 1 to 3 |
| | Channel 1 SP4 to Channel 3 SP4 | Setpoint value 4 of program channel 1 to 3 |
| | PLC Analog output 13 to 16 | Signal of PLC analog output 13 to 16 |
| Analog PLC output block 10 to block 18 | PLC Analog output 1 to 16 | Signal of PLC analog output 1 to 16 |
| Multichannel controller module | | |
| Controller | C01ActualValue to C04ActualValue | Actual value of controller channel 1 to 4 |
| | C01Setpoint to C04Setpoint | Setpoint value of controller channel 1 to 4 |
| | C01OutpLevelMon to C04OutpLevelMon | Output level (display value) of controller module 1 to 4 |
| Analog inputs | AI01 to AI04 | Measured value of analog input 1 to 4 |
| Mathematics | Math01 to Math04 | Result of math function 1 to 4 |
| HW counter | HWCCounter | Counter reading of hardware counter |

3 Configuration

| Category | Signal | Description |
|--|---|---|
| Setpoint value | SP01RampValue to SP04RampValue | Ramp end value of ramp function 1 to 4 (if ramp function switched on) or Active setpoint value (external setpoint value + setpoint value) of setpoint function 1 to 4 (if ramp function switched off) |
| Analog input module 4-channel | | |
| Analog inputs | AI01 to AI04 | Measured value of analog input 1 to 4 |
| Analog input module 8-channel | | |
| Analog inputs | AI01 to AI08 | Measured value of analog input 1 to 4 |
| Multifunction panel 840 | | |
| System bus analog inputs | Counter/Int 1 to Counter/Int 27 | Current value of counter or integrator |
| | Counter/Int clo 1 to Counter/Int clo 27 | Value of counter or integrator in most recent closed measuring period |
| Process image | Current process image | Number of current process image on the display of the multifunction panel 0 = process image 1, 1 = process image 2 etc. (-1 = no active process image) |
| Thyristor power controller, type 70906x | | |
| Measured values master | Individual analog signals of the power controller: See operating manual 70500153T90... (or following table) | Measured values of the power controller in single-phase operation or of the master in case of three-phase economy circuit or three-phase circuit |
| Measured values slave/slave1 | | Measured values of the slave in case of three-phase economy circuit or of slave 1 in case of three-phase circuit |
| Measured values slave2 | | Measured values of slave 2 in case of three-phase circuit |

3 Configuration

Analog signals of the power controller, type 70906x

| Category | Signal | Description |
|------------------------------|---|---|
| Measured values master | Load voltage | RMS value of the load voltage measured by the master between the V and U2 terminals |
| | Load current | RMS value of the load current I1 measured by the master |
| | Power | Active power measured by the master |
| | Load resistance | Resistance (to alternating current) measured by the master |
| | Actual value | Measured value as a percentage of the set control variable U^2 , U, I^2 , I, or P |
| | Effectice setpoint value | Effective setpoint value for the subordinate control loop (with calculated base load and max. output level) |
| | Output level | Output value of the subordinate control loop |
| | Alpha | Currently output phase control angle |
| | Mains voltage | RMS value of the mains voltage measured by the master between the L1 and N/L2 terminals |
| | Mains frequency | Currently measured mains frequency |
| | Device temperature | Currently measured temperature inside the master |
| | Current input | Measured value of the current input, measured at the master between terminals 1 and 2 on X2_1 |
| Voltage input | Measured value of the voltage input, measured at the master between terminals 3 and 4 on X2_1 | |
| Measured values slave/slave1 | Load voltage slave/slave1 | RMS value of the load voltage measured by slave/slave1 between the V and U2 terminals |
| | Load current slave/slave1 | RMS value of the load current I2 measured by slave/slave1 |
| | Power slave/slave1 | Active power measured by slave/slave1 |
| | Load resistance slave/slave1 | Resistance (to alternating current) measured by slave/slave1 |
| | Mains voltage slave/slave1 | RMS value of the mains voltage measured by slave/slave1 between the L1 and N/L2 terminals |
| | Device temp. slave/slave1 | Currently measured temperature inside slave/slave1 |

3 Configuration

| Category | Signal | Description |
|------------------------|------------------------|---|
| Measured values slave2 | Load voltage slave2 | RMS value of the load voltage measured by slave2 between the V and U2 terminals |
| | Load current slave2 | RMS value of the load current I2 measured by slave2 |
| | Power slave2 | Active power measured by slave2 |
| | Load resistance slave2 | Resistance (to alternating current) measured by slave2 |
| | Mains voltage slave2 | RMS value of the mains voltage measured by slave2 between the L1 and N/L2 terminals |
| | Device temp. slave2 | Currently measured temperature inside slave2 |
| | Three-phase power | Total active power of the master and the slaves |



NOTE!

More information on the individual signals can be found in the operating manual of the power controller.

3.5 Digital signals (overview)

The following table contains all signals that are available in the NV connecting list for connection to the external inputs (NV_...) of the power controller.

| Category | Signal | Description |
|--|-------------------------------|---|
| Inactive | | No signal selected |
| Central processing unit | | |
| Digital variables | Digital variable 1 to 64 | Digital variable 1 to 64 (via interface) |
| Program generator 1 to Program generator 9 | Operating contact 1 to 16 | Operating contact 1 to 16 of program channels (in the three program channels, operating contacts with the same name are linked with OR) |
| | Mode: Basic status | Status: Program is not running (basic status) |
| | Mode: Automatic | Status: Program is running (automatic mode, no delay time or program end time) |
| | Mode: Automatic 1 | Status: Program is running (automatic mode, incl. delay time and program end time) |
| | Mode: Standstill | Status: Program stopped during automatic mode (time base stopped) |
| | Mode: Delay | Status: Program start delayed (delay time runs) |
| | Mode: Program end | Status: Program ends (program end time runs, corresponds to length of end signal) |
| | Mode: Manual | Status: Manual mode |
| | Tolerance band channel 1 to 3 | Tolerance band signal of program channel 1 to 3 |
| | Batch control | Signal to control the batch recording (OR-linked signals "Automatic", "Standstill", and "Program end"). |
| | PLC Binary output 28 to 32 | Signal of PLC digital output 28 to 32 |
| Limit monitoring | Limit monitoring 1 to 64 | Output signal of limit value monitoring 1 to 64 |
| Binary linking | Binary linking 1 to 8 | Result of binary linking 1 to 8 |
| | PLC Binary output 9 to 32 | Signal of PLC digital output 9 to 32 |
| Binary PLC output block 13 to block 18 | PLC Binary output 1 to 32 | Signal of PLC digital output 1 to 32 |

3 Configuration

| Category | Signal | Description |
|-------------------------|---------------------------------|--|
| Alarm analog variables | Alarm1 ExAI1 to Alarm1 ExAI64 | Alarm signal 1 of analog variable 1 to 64 |
| | Alarm2 ExAI1 to Alarm2ExAI64 | Alarm signal 2 of analog variable 1 to 64 |
| Alarm integer variables | Alarm1 ExInt1 to Alarm1 ExInt64 | Alarm signal 1 of integer variable 1 to 64 |
| | Alarm2 ExInt1 to Alarm2ExInt64 | Alarm signal 2 of integer variable 1 to 64 |

3 Configuration

| Category | Signal | Description |
|-------------------|------------------------|--|
| Alarms/ Faults | CArm/Fault | System collective alarm or system fault (central processing unit and modules) |
| | CArm/Fault ackn. | System collective alarm or system fault with acknowledgement Signal remains active until acknowledgement. |
| | CArm device | System collective alarm (central processing unit and modules) |
| | CArm ackn. | System collective alarm with acknowledgement Signal remains active until acknowledgement. |
| | Fault | System fault (central processing unit and modules) |
| | Fault ackn. | System fault with acknowledgement Signal remains active until acknowledgement. |
| | CArm Basis | Central processing unit collective alarm |
| | System Run | System state (Run = 1, Stop = 0) |
| | Reserve 1 | (Reserved for future use.) |
| | Fieldbus error | Error at fieldbus interface |
| | System error mandatory | Error in a mandatory module |
| | System error optional | Error in an optional module |
| | No PLC | No PLC program available |
| | PLC stop | „Stop“ system state |
| | Battery empty | Battery alarm (central processing unit buffer battery is dead and must be replaced) Notify service department! Attention: RAM memory content is deleted! |
| | Battery low | Battery pre-warning (central processing unit buffer battery can be replaced within 4 weeks without data loss) Notify service department! |

3 Configuration

| Category | Signal | Description |
|---------------------------------------|------------------------------------|---|
| Multichannel controller module | | |
| Controller | C01ManualMode to C04ManualMode | Manual mode active for controller channel 1 to 4 |
| | C01TuneActive to C04TuneActive | Self-optimization active for controller module 1 to 4 |
| | C01Output1 to C04Output1 | Switch position of first controller output of controller channel 1 to 4 |
| | C01Output2 to C04Output2 | Switch position of second controller output of controller channel 1 to 4 |
| | C01CollAlarm to C04CollAlarm | Collective alarm of controller channel 1 to 4 (can be configured with signals from the digital selector) |
| Setpoint | SP01RampTolBand to SP04RampTolBand | Alarm signal of tolerance band monitoring of ramp function 1 to 4 |
| | SP01Changeover1 to SP04Changeover1 | Bit 0 of setpoint changeover of setpoint value function 1 to 4 |
| | SP01Changeover2 to SP04Changeover2 | Bit 1 of setpoint changeover of setpoint value function 1 to 4 |
| Analog inputs | AI01Alarm1 to AI04Alarm1 | Alarm signal 1 of analog input 1 to 4 |
| | AI01Alarm2 to AI04Alarm2 | Alarm signal 2 of analog input 1 to 4 |
| Digital inputs | DI01, DI02, DI05 to DI10 | Signal of digital input 1, 2, 5 to 10 If the HW counter is activated, the signal of digital input 1 is inactive. |
| Limit monitoring | LI01 to LI04 | Output signal of limit value monitoring 1 to 4 |
| Mathematics | Logic01 to Logic04 | Result of logic function 1 to 4 |
| Miscellaneous | CollectiveAlarm | Controller module collective alarm |
| | HWCounterSignal | Signal of hardware counter in "fill" operating mode (as shut-down signal when threshold value reached) |

3 Configuration

| Category | Signal | Description |
|---|--|--|
| Analog input module 4-channel | | |
| Analog inputs | AI01Alarm1 to AI04Alarm1 | Alarm signal 1 of analog input 1 to 4 |
| | AI01Alarm2 to AI04Alarm2 | Alarm signal 2 of analog input 1 to 4 |
| Digital inputs | DI01 | Signal of digital input |
| Alarm | CollectiveAlarm | Module collective alarm |
| Analog input module 8-channel | | |
| Analog inputs | AI01Alarm1 to AI08Alarm1 | Alarm signal 1 of analog input 1 to 8 |
| | AI01Alarm2 to AI08Alarm2 | Alarm signal 2 of analog input 1 to 8 |
| Digital inputs | DI01 | Signal of digital input |
| Alarm | CollectiveAlarm | Module collective alarm |
| Digital input/output module 12-channel | | |
| Digital inputs | DI01 to DI12 | Signal of digital input 1 to 12 |
| Alarm | CollectiveAlarm | Module collective alarm |
| Multifunction panel 840 | | |
| System bus digital inputs | Alarm batch 1 to Alarm batch 9 | Collective alarm of batch 1 to 9 (process values) |
| | CollectiveAlarm | Collective alarm of multifunction panel (process values) |
| | Fault | Fault in multifunction panel (independent of process values) |
| | Batch 1 active to Batch 9 active | Signal for active batch 1 to 9 |
| | Push button 1 to Push button 18 (as of system version 02: 1 to 32) | Status of push button 1 to 18 (as of system version 02: 1 to 32) in process screen |

3 Configuration

| Category | Signal | Description |
|--|--|---|
| Thyristor power controller, type 70906x | | |
| Device status | Individual digital signals of the power controller: See operating manual 70500153T90... (or following table) | Device status signals |
| Faults master | | Faults of the power controller in single-phase operation or of the master in case of three-phase economy circuit or three-phase circuit |
| Faults slave/ slave1 | | Faults of the slave in case of three-phase economy circuit or of slave 1 in case of three-phase circuit |
| Faults slave2 | | Faults of slave 2 in case of three-phase circuit |
| Faults master slave | | Faults of master slave connection and communication |
| Hardware input/ output | | Binary values of hardware inputs and outputs |
| | | |

Digital signals of the power controller, type 70906x

| Category | Signal | Description |
|---|---|--|
| Device status | Inhibit | Firing pulse inhibit is active (master) |
| | Inhibit slave/slave1 | Firing pulse inhibit of slave/slave1 is active |
| | Inhibit slave2 | Firing pulse inhibit of slave2 is active |
| | Soft start phase | Soft start phase is active |
| | Current limitation active | Current limitation is active |
| | Ext. change-over to phase angle active | External change-over to phase-angle mode is active |
| | Ext. current limit value active | Current limitation uses the external current limit value |
| | Reconfiguration active | Device is currently being reconfigured |
| | Manual mode active | Device works in manual mode |
| | Keyboard locked | Keyboard is locked |
| | Display lighting deactivated | Display lighting is deactivated |
| | Rotating field detected | Rotating field has been detected |
| | Resistance limitation active | Resistance limitation is active |
| Ext. change-over of setpoint specification active | External change-over of setpoint specification (source of setpoint value) is active | |

3 Configuration

| Category | Signal | Description |
|------------------|---|---|
| Faults master | Collective fault | Collective fault (OR combination of individual alarms and error messages; configurable) |
| | Low alarm | Value has gone below the low (min.) limit value |
| | High alarm | Value has exceeded the high (max.) limit value |
| | Load error | Load error has been detected |
| | Missing teach-in | Teach-In values (measured load values for load monitoring) have not been determined |
| | Fuse breakage | Semiconductor fuse is defective |
| | Thyristor breakage | Thyristor is defective |
| | Thyristor short-circuit | Thyristor is defective |
| | Limitation active due to over-temp. | Power limitation is active due to over-temperature (device temperature higher than 105 °C) |
| | Over-temperature | Over-temperature (device temperature higher than 100 °C) |
| | Mains voltage is too low | Mains voltage is out of tolerance range |
| | Mains voltage is too high | Mains voltage is out of tolerance range |
| | Short-term mains drop | Temporary mains voltage drops have been detected |
| | Wire break current input | Wire break at current input (input current for the set measuring range is out of valid range) |
| | Wire break voltage input | Wire break at voltage input (input voltage for the set measuring range is out of valid range) |
| System bus error | Communication via JUMO mTRON T system bus is disrupted (no connection to the measuring, control, and automation system) | |

3 Configuration

| Category | Signal | Description |
|-------------------------|--|---|
| Faults slave/ slave1 | Low alarm slave/slave1 | Value has gone below the low (min.) limit value |
| | High alarm slave/slave1 | Value has exceeded the high (max.) limit value |
| | Load error slave/slave1 | Load error has been detected |
| | Fuse breakage slave/slave1 | Semiconductor fuse is defective |
| | Thyristor breakage lave/slave1 | Thyristor is defective |
| | Thyristor short-circuit slave/ slave1 | Thyristor is defective |
| | Limitation active due to over- temp. of slave/slave 1 | Power limitation is active due to over-tempera- ture (device temperature higher than 105 °C) |
| | Over-temperature slave/slave1 | Over-temperature (device temperature higher than 100 °C) |
| | Mains voltage of slave/slave1 is too low | Mains voltage is out of tolerance range |
| | Mains voltage of slave/slave1 is too high | Mains voltage is out of tolerance range |
| | Short-term mains drop slave/ slave1 | Temporary mains voltage drops have been detected |

3 Configuration

| Category | Signal | Description |
|---------------------|---|--|
| Faults slave2 | Low alarm slave2 | Value has gone below the low (min.) limit value |
| | High alarm slave2 | Value has exceeded the high (max.) limit value |
| | Load error slave2 | Load error has been detected |
| | Fuse breakage slave2 | Semiconductor fuse is defective |
| | Thyristor breakage slave2 | Thyristor is defective |
| | Thyristor short-circuit slave2 | Thyristor is defective |
| | Limitation active due to over-temp. of slave2 | Power limitation is active due to over-temperature (device temperature higher than 105 °C) |
| | Over-temperature slave2 | Over-temperature (device temperature higher than 100 °C) |
| | Mains voltage of slave2 is too low | Mains voltage is out of tolerance range |
| | Mains voltage of slave2 is too high | Mains voltage is out of tolerance range |
| | Short-term mains drop slave2 | Temporary mains voltage drops have been detected |
| Faults master slave | Master slave synchronisation failed | Synchronisation between master and slave failed (slave switched off or communication between master and slave interrupted) |
| | Error in master slave communication | Error in the data transfer between master and slave |
| | Data cable faulty | Communication between master and slave interrupted |
| | Rotation field detection failed | Rotary field detection not possible |
| | Rotation field error | Rotary field error has been detected (counter-clockwise rotary field; or patch cables from master to slave 1 and slave 2 are mixed up) |
| | Wiring error | Wiring error detected in master, slave 1, or slave 2 |

3 Configuration

| Category | Signal | Description |
|---------------------------|-----------------|-----------------------------|
| Hardware input/ output | Inhibit input | Signal at the inhibit input |
| | Digital input 1 | Signal at digital input 1 |
| | Digital input 2 | Signal at digital input 2 |
| | Digital output | Signal at digital output |



NOTE!

More information on the individual signals and the possible error causes can be found in the operating manual of the power controller.

3 Configuration

3.6 Configuration of the power controller

To integrate a power controller into the measuring, control, and automation system, the following aspects in particular must be taken into consideration when configuring the power controller.

Inputs

It may be necessary to configure the following parameters so that the relevant inputs can be controlled via interface (the terms in brackets designate the external input of the power controller within the measuring, control, and automation system):

- Setpoint value configuration > Setpoint specification (NV_Setpoint)
- Setpoint value configuration > Alpha input (NV_AlphaDefault)
- Analog output > Value to be output (NV_AO)
- Digital output > Output mode (NV_DO)

The following external inputs are controlled directly via interface (no configuration required):

- Ext. inhibit input (NV_ExtInhibitIn)
- Ext. digital input 1 (NV_ExtDigitIn1)
- Ext. digital input 2 (NV_ExtDigitIn2)

If the signal at the ext. inhibit input is TRUE, the thyristors are no longer triggered.

Ext. digital inputs 1 and 2 can be used to activate specific functions. To do this, they must be configured accordingly in the "Digital inputs" menu.

Replacement values

It may be necessary to set a replacement value for the setpoint value:

- Setpoint value configuration > Input in the event of an error: adjustable value
- Setpoint value configuration > Value in the event of an error: 0

If a malfunction occurs, the power controller output is switched off with this setting, which corresponds to the default setting. This is the case, for example, if the setpoint value is specified by the measuring, control, and automation system and the transmission via the system bus is interrupted.

If a malfunction occurs, the following replacement values are used:

- Setpoint value: configurable (see above)
- Phase angle alpha: 180°
- Analog output: 0 %
- Digital output: FALSE
- Ext. inhibit input: FALSE
- Ext. digital input 1: FALSE
- Ext. digital input 2: FALSE

Collective fault

It may be necessary to change the default configuration of the "Collective fault" signal (OR link of individual alarms and fault messages).

**NOTE!**

If the power controller setpoint value is to be specified by an independently operating multi-channel controller module, the power controller and the controller module must be connected via an analog signal. In this case, the setpoint value is transmitted via an analog output of the controller module to an analog input of the power controller. The controller module and the power controller must be configured accordingly for this.

For further information about configuration, please refer to the power controller operating manual.

3 Configuration



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