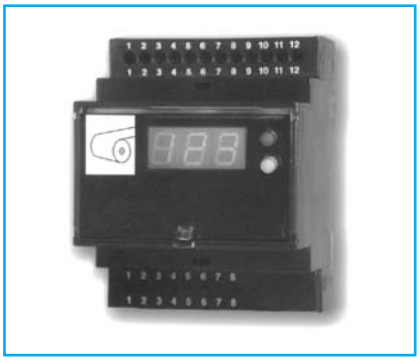
WARNER ELECTRIC

TCS251

PID multi-regulator board with PWM output

Connections and setting with dancer arm



SERVICE MANUAL

Warner Electric

MC557-gb-0506

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Dancer arm control

Ce mode de fonctionnement vous permet de régler la position du bras danseur et, indirectement, la tension en ajustant la pression appliquée à l'intérieur du piston du rouleau.

Le régulateur TCS-251 reçoit le signal analogique indiquant la position du rouleau danseur, la vitesse de la machine et la vitesse de la bobine (ou le diamètre) et puis fournit en sortie 2 signaux analogiques (couple et vitesse) pour commander un driver (moteur), en conséquence le bras danseur reste toujours à la position désirée (consigne).

Programming

Une liste de brèves descriptions sur les fonctions de programmation de l'appareil sont donnés ci dessous. Pour une description détaillée des fonctions de programmation, demander à Warner Electric.

To enter the programming environment, press the ⏎ key for approximately 3 seconds. The number of the function ("F.1") will then appear on the display.

To scroll the programming function menu use the + and − keys.

To modify the parameters belonging to a function call up the number of the desired function on the display, press the ⏎ key and the function value set is displayed. Change the setting to the desired value by pressing the + and − keys, and then press the ⏎ key to confirm.

Operating functions

Function	Description	Value range	Factory setting
1	Entering the password	0➛999	0
2	Accessing calibration	*	*
3	Setting proportional band in AUTO	0➛99.9	10.0
4	Setting integral band in AUTO	0➛9.99	0.30
5	Setting derived band in AUTO	0➛9.99	7.00
6	Setting proportional band in ACC	0➛99.9	10.0
7	Setting integral band in ACC	0➛9.99	0.30
8	Setting derived band in ACC	0➛9.99	7.00
9	Setting proportional band in DEC	0➛99.9	10.0
10	Setting integral band in DEC	0➛9.99	0.30
11	Setting derived band in DEC	0➛9.99	7.00
12	Setting proportional band in STOP	0➛99.9	0.0
13	Setting derived band in STOP	0➛9.99	0.00
14	Setting tension when machine is stationary	0➛999	0
15	Emergency stop	0➛999	600
16	Display filter	0➛99	75
17	AIN1 input filter	0➛99	10
18	AIN2 input filter	0➛99	10
19	Setting password	0➛999	0
20	Setting decimal point	0➛3	0
21	Setting tension setpoint	0➛FS	50
23	Percentage variation in proportional gain	0➛100	0
24	Percentage variation in derived band	0➛100	0

Fonctions de calibrages

Function	Description	Value range	Factory setting
50	Function reset	*	*
51	Selecting AIN0 input type	0➛2	0
52	Selecting AIN1 input type	0➛1	0
53	Selecting AIN2 input type	0➛1	0
54	Selecting output type	0➛2	0
55	Setting AIN0 input full scale	0➛999	100
56	Zeroing AIN0 input	*	*
57	Calibrating AIN0 input	*	*
60	Selecting DIN1 input function	0➛1	1
61	Using coil diameter or speed for determining adjustments	0➛1	1
62	Adjusting rewinder or unwinder	0➛1	0
63	Maximum diameter	0➛999	100
64	Minimum diameter	0➛DMax	9
65	Calibrating diameter	DMin➛DMax	50
67	Setting torque saturation constant	0➛999	150
68	Speed for AUTO/STOP switchover	1➛999	20
69	Display brightness	0➛10	2
70	Displaying operating mode	*	*
73	Setting AUTO/STOP switchover mode	0➛1	0

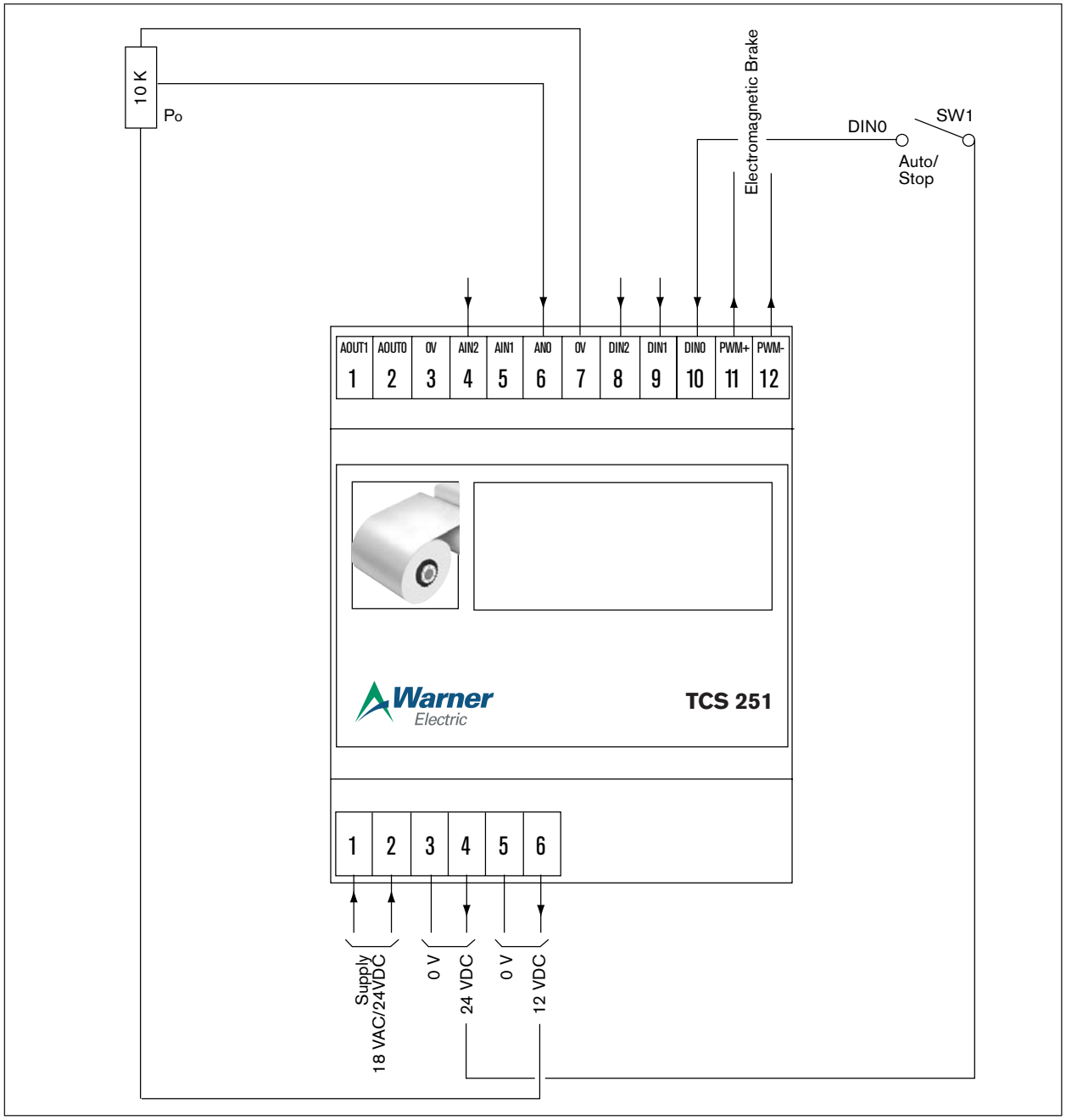
To exit the programming environment scroll the function menu until you reach function 73, then press the ⊞ key or move onto function 1 and press the ⊟ key.

Fast set up

This section describes the installation and test procedures that must be carried out if you wish to set the instrument up quickly. It also includes the wiring diagrams and a description of how to use the digital inputs.
For more detailed descriptions, please consult Warner Electric.

1. Fit the control device;
2. Make the electrical connections as illustrated in the § Wiring diagrams on page 4.
3. Connect the instrument to a power supply;
4. The word 'HI' should appear on the display and it should get steadily brighter;
5. Enter the programming environment: the number of the function that is currently selected (F. 1) is shown on the display;
6. Using the ⊞ key, select **function 2**. Press ↵ and the word 'CAL' will appear on the display and flash three times, then the calibration functions needed for the -02 operating mode fast set up are given in sequence.
7. **Function 51** appears on the display. Use this function to select the type of input for the dancer (AIN0). Press ↵ and the function value set is displayed. Using the ⊞ or ⊟ key, set the value to 0 for a 0-10V input, to 1 for a 0-5V input and to 2 for a mA input. Press ↵ to confirm and ⊞ to move onto the next function.
8. **Function 55** appears on the display. Use this function to set the position full scale for the dancer, which is normally set at the factory value (100). Press ↵ and the function value set is displayed. Using the ⊞ or ⊟ key, set the value to the desired position full scale. Press ↵ to confirm and ⊞ to move onto the next function.
9. **Function 56** appears on the display. Position the dancer so that it supplies the maximum voltage (e.g.: 0V). Press ↵ and the word 'YES' flashes on the display, then the number of the function (F.56) is displayed again. Press the ⊞ key to move onto the next function.
10. **Function 57** appears on the display. Position the dancer so that it supplies the maximum voltage (e.g.: 10V). Press ↵ and the word 'YES' flashes on the display, then the number of the function (F.57) is displayed again. Press the ⊞ key to move onto the next function.

Electric wiring - TCS251 with dancer arm



Recommended setting for dancer arm

F3 = P
F4 = I
F3 = D
Note: You must start with these values
P = 40, I = 0, D = 0

F55 = full scale(often 100%)

F56 = Down calibration for AIN0
Turn the sensor to have 0 volt between pin 6 and 7 and push ⏎

F57 = Up calibration for AIN0
Turn the sensor to have max voltage between pin 6 and 7 and push ⏎

F71 = 0 Not use

F72 = 0 Not use

F14 = Holding torque when stop
- if F66=0 then PWM output= constant
- if F66=1 then PWM output= last output value before to go in stop mode

Analog and digital I/O descriptions

Digital inputs

Pin: DIN0

Function: **AUTO/STOP**

It is active if F.73=1.

If the input is in the "HIGH" logic state (+24 Vdc the device switches to the AUTO state, otherwise it is in the STOP state.

When F.73=0 the switchover between the STOP and AUTO states (and vice versa) takes place automatically when the line speed goes above (or below) the value set at F.68.

Pin: DIN1

If F.60 = 0

Function: **ZERO**

If the input is in the "HIGH" logic state (+24 Vdc) the device switches to the ZERO state, zeroing the brake control output voltage.

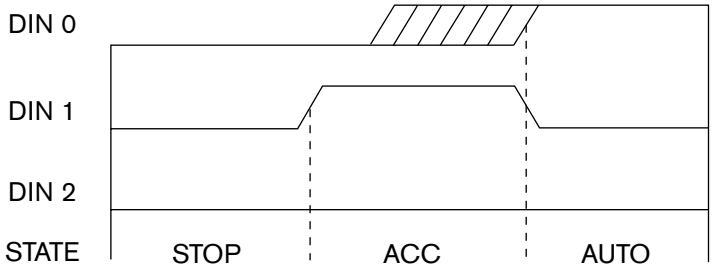
N.B.: The ZERO state is applied only if the device is in the STOP state.

If F.60 = 1

Function: **ACC**

If the input is in the "HIGH" logic state (+24 Vdc) the device switches to the ACC state, performing adjustments with the set of PID acceleration parameters (F.6, F.7 and F.8).

The following diagram illustrates the correct activation sequence of the digital inputs for passing from the STOP to the AUTO state, through the acceleration state.



Pin: DIN2

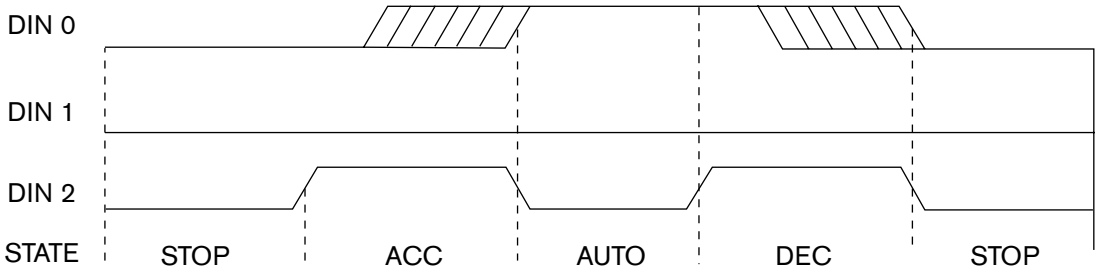
If F.60 = 0

Function: **ACC or DEC**

If the input is in the 'HIGH' logic state (+24Vdc) the device switches:

- to the ACC state, if it was initially in STOP;
- to the DEC state, if it was initially in AUTO.

The following diagram illustrates the correct activation sequence of the digital inputs for passing from the STOP to the AUTO state, through the ACC state and, vice versa, from the AUTO to the STOP state , through the DEC state



Analog inputs

Pin: AIN0

Function: **Dancer analog input**

This accepts an analog signal proportional to the position of the dancer. It is connected to the dancer position sensor output.

The type of input accepted can be altered during calibration by changing the software settings; in particular:

If F.51 = 0
0-10V
If F.51 = 1
0-5V
If F.51 = 2
0-20 mA

Pin: AIN1

Function: **Line speed analog input**

This accepts an analog signal proportional to the machine line speed. It is connected to the output of a dynamo or of an analog encoder which detects the speed of rotation of the machine MASTER motor.

The type of signal accepted can be altered during calibration by changing the software settings; in particular:

If F.52 = 0
0-10V
If F.52 = 1
0-5V

Pin: AIN2

Function: **Coil speed or diameter analog input**

This accepts an analog signal proportional to the coil speed (F.60=1) or coil diameter (F.60=0). It is connected to the analog output of a dynamo which detects the speed of rotation of the coil or of a diameter reader (a Warner Electric US sensor or probe).

The type of signal accepted can be altered during calibration by changing the software settings; in particular:

If F.53 = 0
0-10V
If F.53 = 1
0-5V

Sorties analogiques

Pin: AOUT0

Function: **Analog output for the motor speed command**

This supplies an analog speed reference for the motor. It must be connected to the motor driver speed analog input.

The type of signal accepted can be altered during calibration by changing the software settings; in particular:

If F.54 = 0
0-10V 10mA max
If F.54 = 1
-5-+5V 20mA max
If F.54 = 2
4-20mA R_{load} = 330 Ohm max

Pin: AOUT1

Fonction: **Analog output for the motor torque command**

This supplies an analog torque reference for the motor. It must be connected to the motor driver torque analog input, which allows modulation of the current in the motor armatures.

The analog reference type is:

0-10V 10mA max

BTCS251 - REGULATOR WITH POTENTIOMETER

Function setting

After wiring, enter these values in the control. Please respect this order.

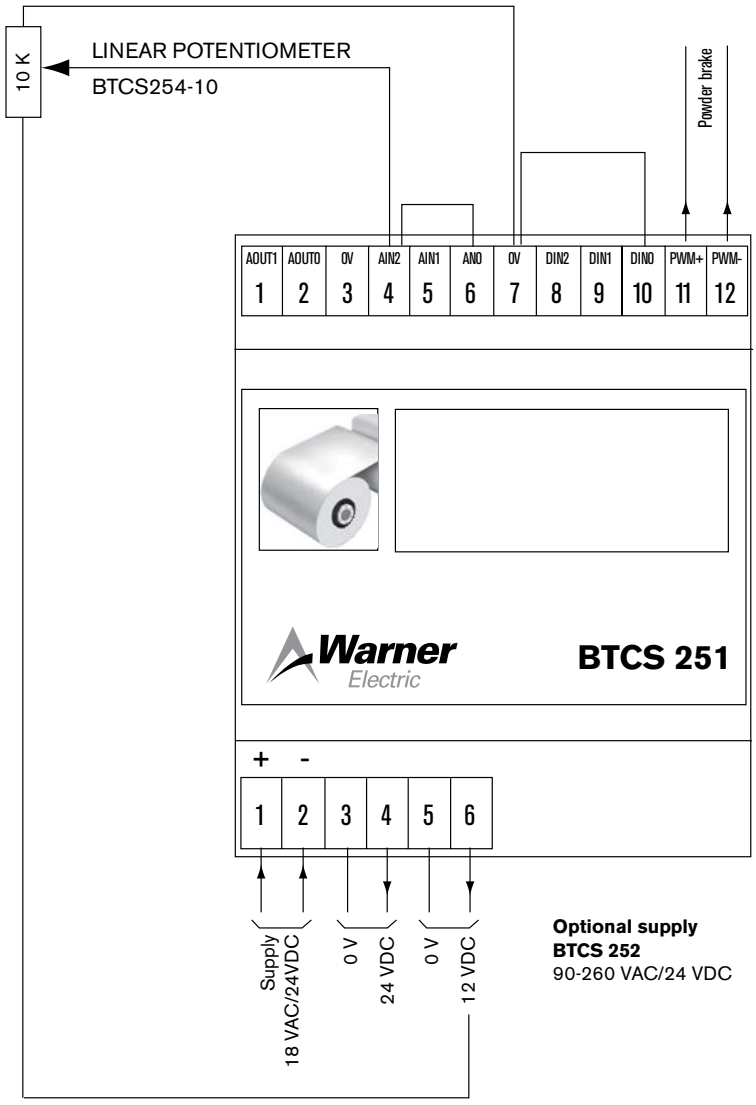
<u>Be careful:</u> F72 is overload function; if the power is off and after on with some trouble on supply, the function can be automatically set to 0.

That means the output is in maximum braking to protect people.

To restart, set the F72 to 1

Function	Value	Description
F3	99.9	proportional band
F4	0	integral band
F5	0	derived band
F14	999	Max output adjustment
F53	0	AIN2 input 0-10 volts
F55	100	AIN0 full scale
F56	min. volt on AIN0 input	Calibrating min. signal on AIN0
F57	max. volt on AIN0 input	Calibrating max. signal on AIN0
F64	min. volt on AIN2 input	Calibrating min. signal on AIN2
F63	max. volt on AIN2 input	Calibrating max. signal on AIN2
F66	0	output enable for F14 value
F72	1	input enable for AIN2 analog signal

Wiring



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Subject to alteration without prior notice
SM563-gb rev0306

BTCS251 - REGULATOR WITH ULTRASONIC SENSOR

Function setting

After wiring, enter these values in the control. Please respect this order.

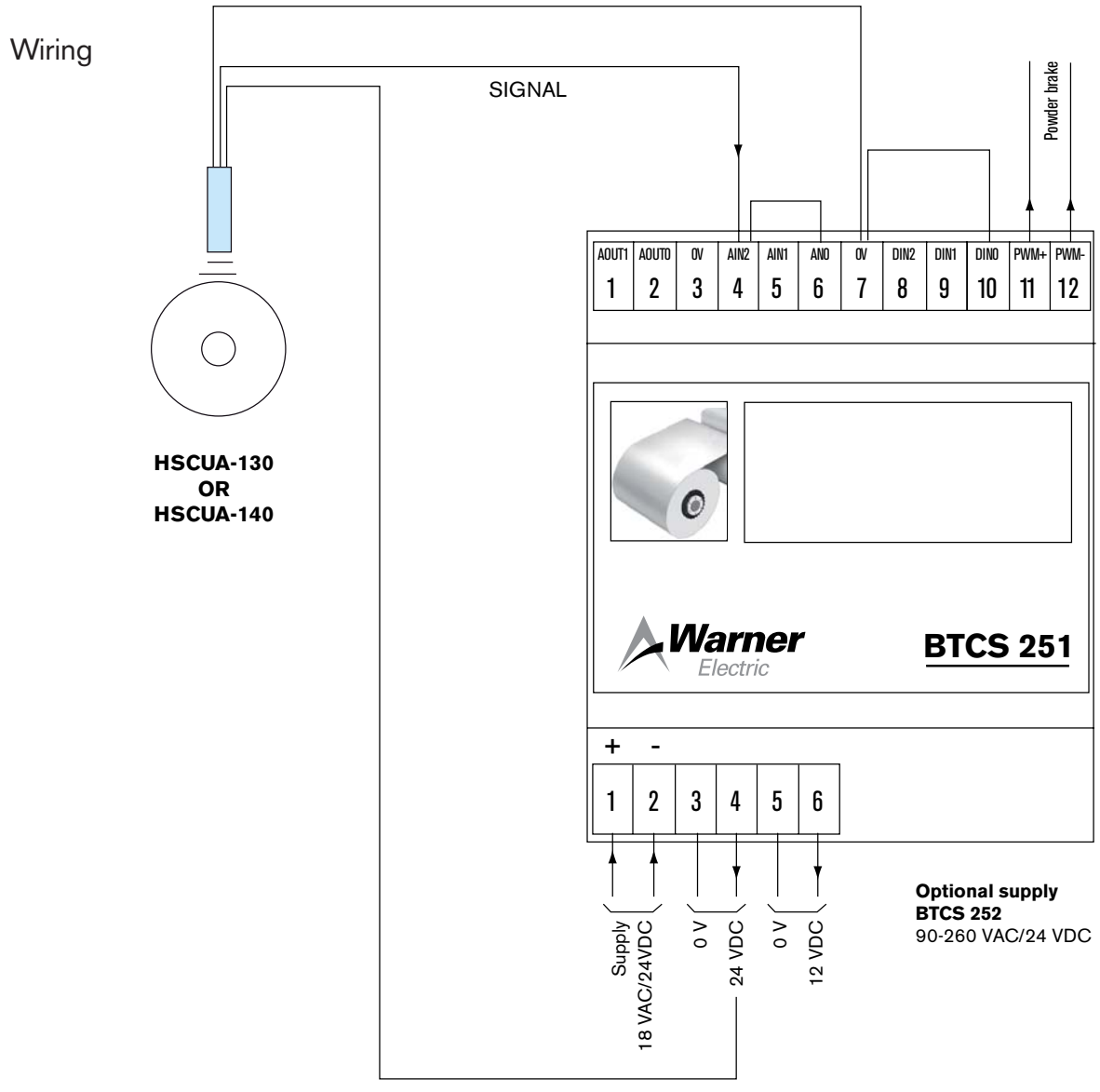
<u>Be careful:</u> F72 is overload function; if the power is off and after on with some trouble on supply, the function can be automatically set to 0.

That means the output is in maximum braking to protect people.

To restart, set the F72 to 1

Function	Value	Description
F3	99.9	proportional band
F4	0	integral band
F5	0	derived band
F14	999	Max output adjustment
F53	0	AIN2 input 0-10 volts
F55	100	AIN0 full scale
F56	min. volt on AIN0 input	Calibrating min. signal on AIN0
F57	max. volt on AIN0 input	Calibrating max. signal on AIN0
F64	min. volt on AIN2 input	Calibrating min. signal on AIN2
F63	max. volt on AIN2 input	Calibrating max. signal on AIN2
F66	0	output enable for F14 value
F72	1	input enable for AIN2 analog signal

Wiring



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BTCS251 - REGULATOR WITH 0 - 10 V SIGNAL

Function setting

After wiring, enter these values in the control. Please respect this order.

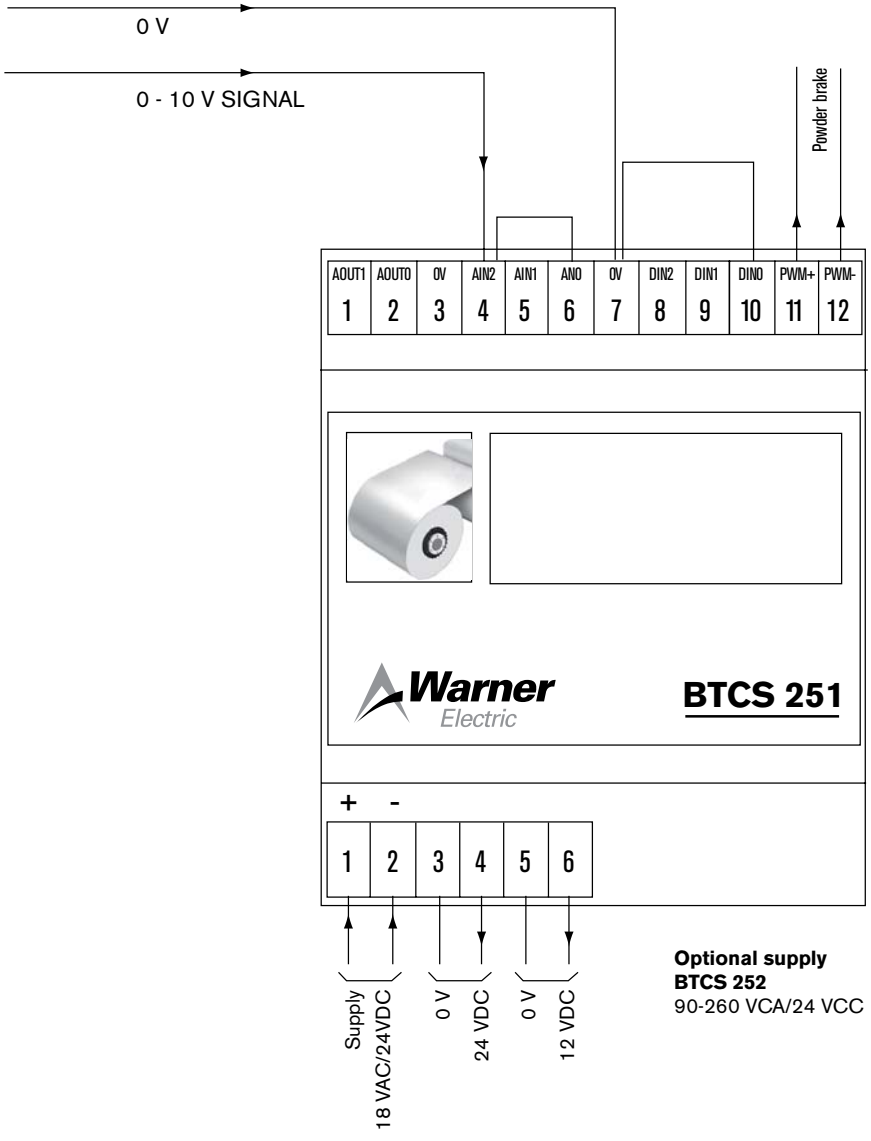
<u>Be careful:</u> F72 is overload function; if the power is off and after on with some trouble on supply, the function can be automatically set to 0.

That means the output is in maximum braking to protect people.

To restart, set the F72 to 1

Function	Value	Description
F3	99.9	proportional band
F4	0	integral band
F5	0	derived band
F14	999	Max output adjustment
F53	0	AIN2 input 0-10 volts
F55	100	AIN0 full scale
F56	min. volt on AIN0 input	Calibrating min. signal on AIN0
F57	max. volt on AIN0 input	Calibrating max. signal on AIN0
F64	min. volt on AIN2 input	Calibrating min. signal on AIN2
F63	max. volt on AIN2 input	Calibrating max. signal on AIN2
F66	0	output enable for F14 value
F72	1	input enable for AIN2 analog signal

Wiring



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