



Case Studies

DGT300⁺_{NG}

1. Open Loop - Diameter measurement
2. Dancer application
3. Load cells tension control
4. Motor unwind /rewind
5. Motor infeed / outfeed intermediate control
6. Speed follower solution
7. Complementary wiring diagram

01

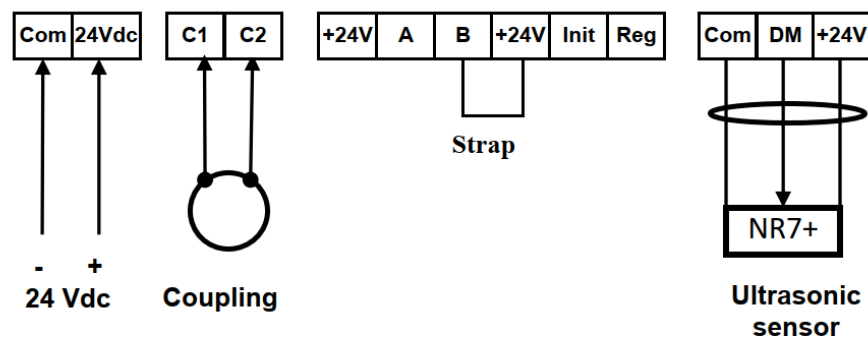
Diameter measurement → Open Loop control

Ultrasonic or laser sensor measures distance from a fixed point to the external surface of the roll.
Controller provides right torque level according to the radius and keep the tension constant all along running process.



01-1

Wiring



01-2

Starting parameter set

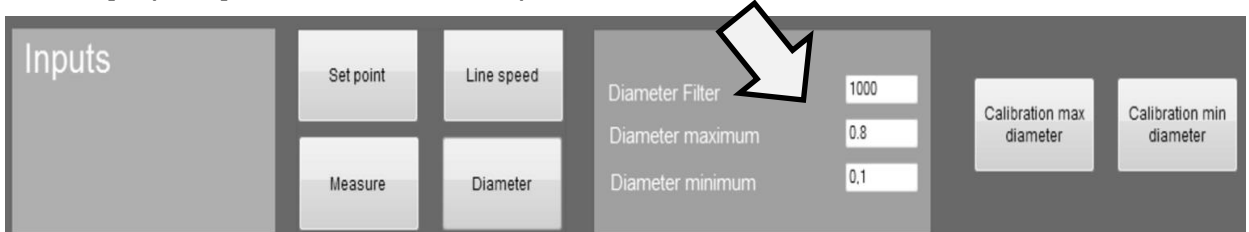
DISPLAY	<i>Ligne 1</i>	Setpoint
	<i>Ligne 2</i>	Diameter
PROCESS	<i>Time delay start</i>	
	<i>Time delay stop</i>	
	<i>Hold</i>	
INPUTS	<i>Max effort</i>	100
	<i>Set point value</i>	50
	<i>Diameter filtering</i>	1000
	<i>Ligne speed filtering</i>	
OUTPUTS	<i>Upper limit</i>	10
	<i>Bottom limit</i>	0
	<i>Power output gain</i>	100
REGULATION	<i>P</i>	
	<i>I</i>	
	<i>D</i>	
	<i>Measurement filtering</i>	
	<i>Open loop coefficient</i>	100
	<i>Close loop coefficient</i>	0
	<i>Speed gain</i>	
	<i>Speed coefficient</i>	
	<i>Overspeed</i>	

01-3

Calibration

1 - Calibration sensors US & Laser

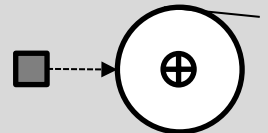
Select [Inputs] > Diameter and set parameters data



Send parameters to Memory (M1 à M5)



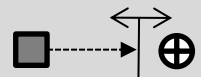
- Simulate max diameter of the roll
click [**Calibration max diameter**]



- Simulate min diameter of the roll
click [**Calibration min diameter**]



- Check diameter variation on the whole range



2 – Set point

Define Effort Max [Regulation] [Open loop]

100%, or max tension available for max torque and max diameter

Select int. or ext. (0-10 V) in menu [Inputs] > Setpoint

3 - Definition inputs / outputs

see -> Menus [Inputs] & [Outputs] and define relevant values according to your application.

4 – Power output (brake and clutch current setting)

See -> Menu [Output] > power C1 C2 and set relevant power output gain

5 – Special functions

Details of all special functions (taper, Estop...) necessary to your application are available in Help menu (click on icon )

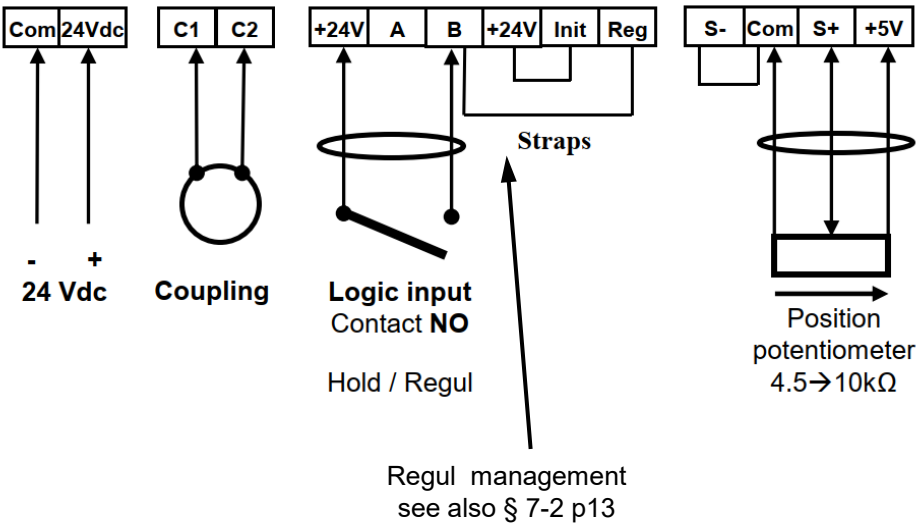
02

Dancer
→ Closed Loop control

Tension is related to the force applied on the dancer roll (fixed weight or pressure in a pneumatic cylinder).
A potentiometer sensor measures dancer roll position. Torque is automatically adjusted to hold dancing roller at the same intermediate position.



02-1 Wiring



02-2 Starting parameter set

DISPLAY	Ligne 1	Setpoint
	Ligne 2	Measure
PROCESS	Time delay start	1
	Time delay stop	300
	Hold	100
INPUTS	Max effort	
	Set point value	50
	Diameter filtering	
	Ligne speed filtering	
OUTPUTS	Upper limit	10
	Bottom limit	0
	Power output gain	100
REGULATION	P	100
	I	5
	D	100
	Measure filtering	5
	Open loop coefficient	0
	Close loop coefficient	100
	Speed gain	0
	Speed coefficient	
	Overspeed	0

02-3

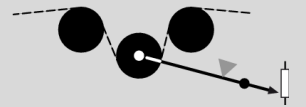
Calibration

1 - Calibration of dancer position

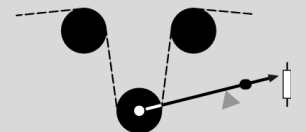
Select [Inputs] > Measure and set parameters data

Send parameters to Memory (M1 à M5)

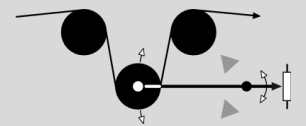
- Position dancer in top position
click [**Calibration high value**]



- Position dancer in bottom position
click [**Calibration low value**]



- Check variation is continuous from bottom to top position



2 – Set point

Set point is usually the medium dancer position (internal value 50%)

See menu [Inputs] > Setpoint

3 - Definition inputs / outputs

see -> Menus [Inputs] & [Outputs] and define relevant values according to your application.

4 – Power output (brake and clutch current setting)

See -> Menu [Output] > power C1 C2 and set relevant power output gain

5 – Special functions

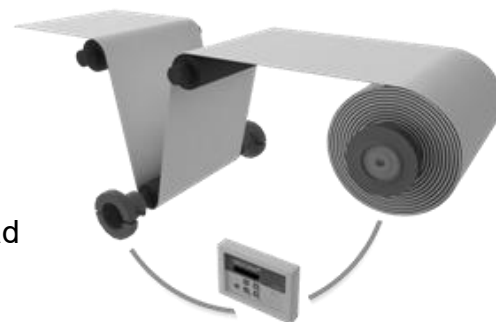
Details of all special functions (taper, Estop...) necessary to your application are available in Help menu (click on icon )

03

Tension control with load cells → Closed loop control

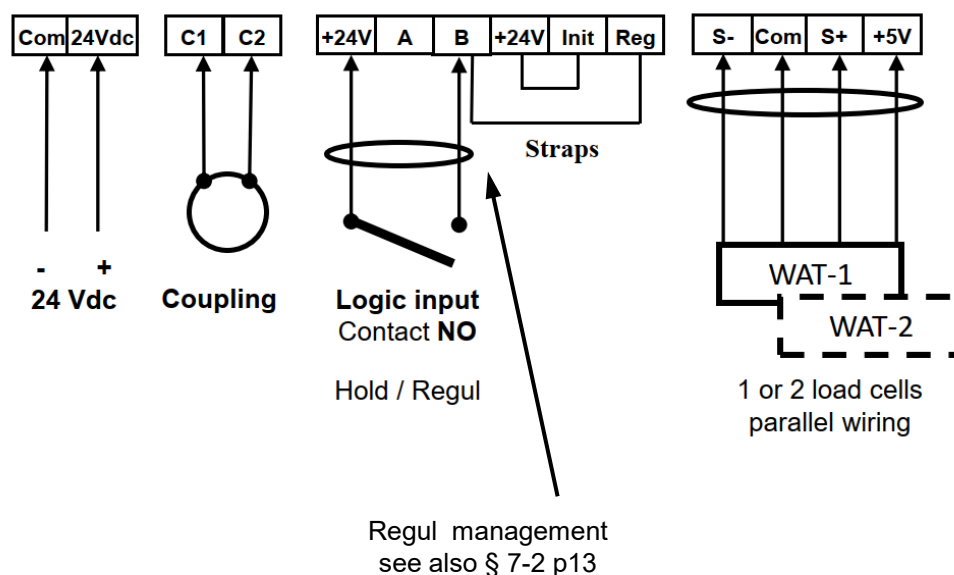
Tension on the product is given by the continuous monitoring of difference between set point and load cells measurement feedback.

Torque is automatically adjusted through a PID control loop to keep actual tension as closed as possible to set point tension value.



03-1

Wiring



03-2

Starting parameter set

DISPLAY	<i>Ligne 1</i>	Setpoint
	<i>Ligne 2</i>	Measure
PROCESS	<i>Time delay start</i>	1
	<i>Time delay stop</i>	300
	<i>Hold</i>	10
INPUTS	<i>Max effort</i>	
	<i>Set point value</i>	50
	<i>Diameter filtering</i>	
	<i>Ligne speed filtering</i>	
OUTPUTS	<i>Upper limit</i>	10
	<i>Bottom limit</i>	0
	<i>Power output gain</i>	100
REGULATION	<i>P</i>	100
	<i>I</i>	20
	<i>D</i>	0
	<i>Measure filtering</i>	100
	<i>Open loop coefficient</i>	0
	<i>Close loop coefficient</i>	100
	<i>Speed gain</i>	0
	<i>Speed coefficient</i>	
	<i>Overspeed</i>	0

03-3

Calibration

1 - Calibration load cell measurement

Select [Inputs] > Measure and set parameters data

Enter calibration weight value : [Upper level value] (here 75N)

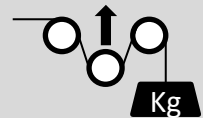
If the weight is not equal to max tension required for the application (here 200N), define in [full scale %], its percentage compared to max tension (here 37.5%)

Inputs	Set point	Line speed	Measure Filter	100	Calibration high value	Calibration low value
	Measure	Diameter	full scale %	37.5	Tare	Preset 0-10V scale
			Upper level value	75		
			Bottom level value	0		

Send parameters to Memory (M1 à M5)

Data									

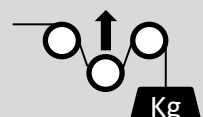
- Simulate the load with a string following the product path and hang the weight.
click [**Calibration high value**]



- Remove the load and any stress on the load cells
click [**Calibration low value**]
→ Calibration done



- Check your measure readout for minimum & maximum load



2 – Set point

Set point is required tension level for your application

Select int. or ext. (0-10 V) in menu [Inputs] > Setpoint

See menu [Inputs] > Setpoint

3 - Definition inputs / outputs

see -> Menus [Inputs] & [Outputs] and define relevant values according to your application.

4 – Power output (brake and clutch current setting)

See -> Menu [Output] > power C1 C2 and set relevant power output gain

5 – Special functions

Details of all special functions (taper, Estop...) necessary to your application are available in Help menu (click on icon )

04

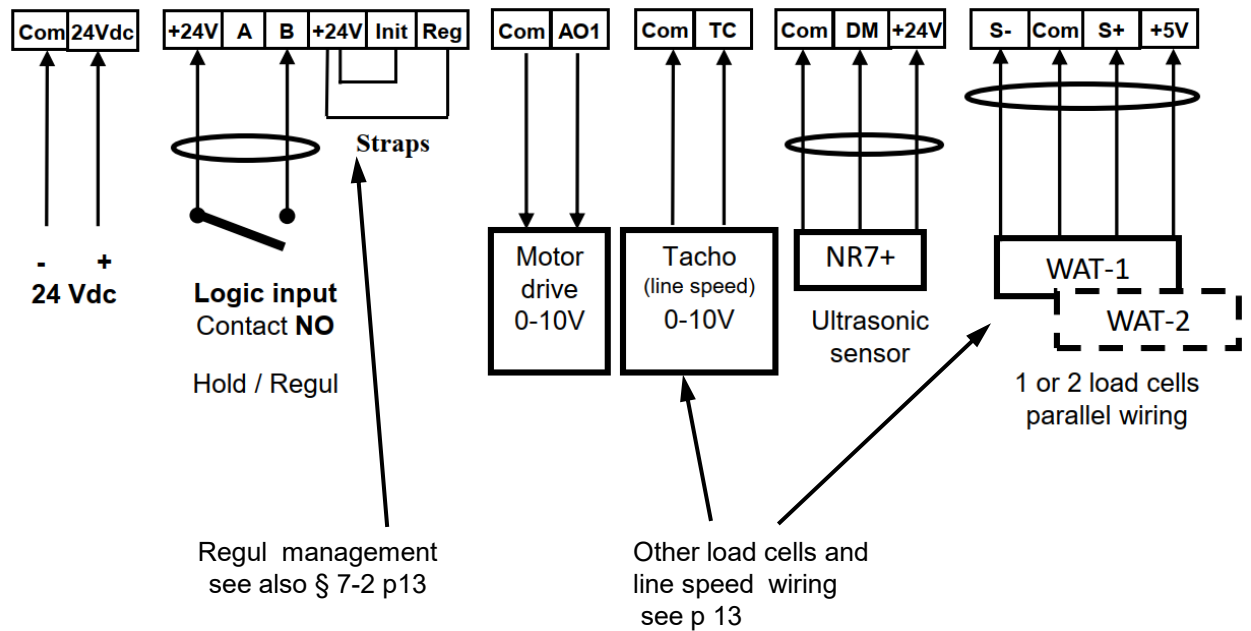
Motor application unwind / rewind solution

Control tension solution with motor speed drive.



04-1

Wiring



04-2

Starting parameter set

DISPLAY	Ligne 1	Setpoint
	Ligne 2	Measure
PROCESS	Time delay start	1
	Time delay stop	300
	Hold	10
INPUTS	Max effort	
	Set point value	50
	Diameter filtering	
	Ligne speed filtering	
OUTPUTS	Upper limit	10
	Bottom limit	0
	Power output gain	100
REGULATION	P	10
	I	5
	D	0
	Measure filtering	100
	Open loop coefficient	0
	Close loop coefficient	100
	Speed gain	Calcul !
	Speed coefficient	100
	Overspeed	0

04-3 **Formula Regulation / Speed Gain** =
$$\frac{10 \cdot V_L}{V_R}$$

04-4 **Case : line speed with 0-10 V tacho signal**

Inputs : COM / TC

V_L (mpm) = linear speed for 10 V in tacho input

V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO1 output (or 10V on motor drive input))

04-5 **Case : line speed with encoder (pulses) signal**

Inputs : COM / LS – see wiring p13

V_L (mpm) = linear speed for encoder signal = 30 kHz

V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO1 output (or 10V on motor drive input))

04-6 **Calibration**

Diameter calibration

> See p2

Load cell calibration

> See p6

Set point definition

> See p6

Definition inputs / outputs

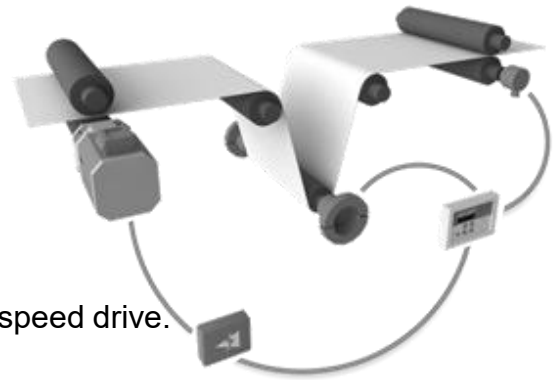
➤ See p6

Special functions

> See p6

05

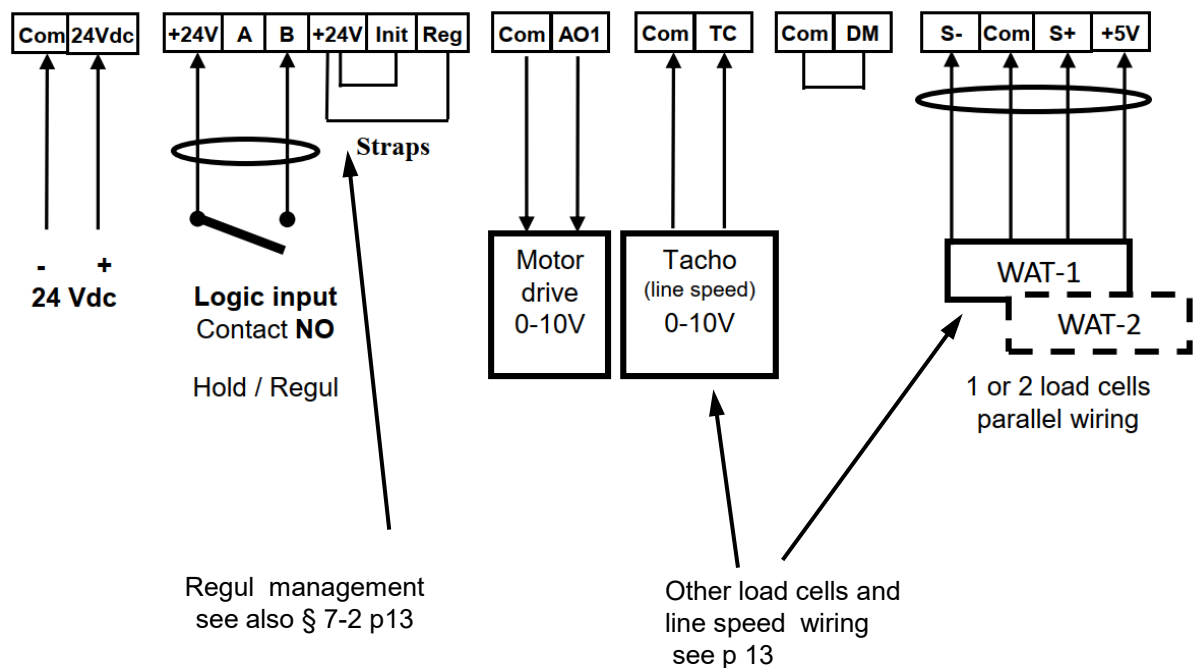
Motor application Infeed / outfeed solution (intermediate tension control)



Intermediate tension control solution with motor speed drive.

05-1

Wiring



05-2

Starting parameter set

DISPLAY	<i>Ligne 1</i>	Setpoint
	<i>Ligne 2</i>	Measure
PROCESS	<i>Time delay start</i>	1
	<i>Time delay stop</i>	300
	<i>Hold</i>	10
INPUTS	<i>Max effort</i>	
	<i>Set point value</i>	50
	<i>Diameter filtering</i>	
	<i>Ligne speed filtering</i>	
OUTPUTS	<i>Upper limit</i>	10
	<i>Bottom limit</i>	0
	<i>Power output gain</i>	100
REGULATION	<i>P</i>	10
	<i>I</i>	5
	<i>D</i>	0
	<i>Measure filtering</i>	100
	<i>Open loop coefficient</i>	0
	<i>Close loop coefficient</i>	100
	<i>Speed gain</i>	Calcul !
	<i>Speed coefficient</i>	100
	<i>Overspeed</i>	0

05-3 **Formula Regulation / Speed Gain** =
$$\frac{10 \cdot V_L}{V_R}$$

05-4 **Case : line speed with 0-10 V tacho signal**

Inputs : COM / TC

V_L (mpm) = linear speed for 10 V in tacho input

V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO1 output (or 10V on motor drive input))

05-5 **Case : line speed with encoder (pulses) signal**

Inputs : COM / LS – see wiring p13

V_L (mpm) = linear speed for encoder signal = 30 kHz

V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO1 output (or 10V on motor drive input))

05-6 **Calibration**

Diameter calibration

> See p2

Load cell calibration

> See p6

Set point definition

> See p6

Definition inputs / outputs

➤ See p6

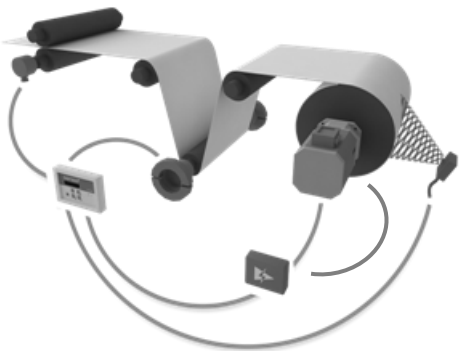
Special functions

> See p6

06

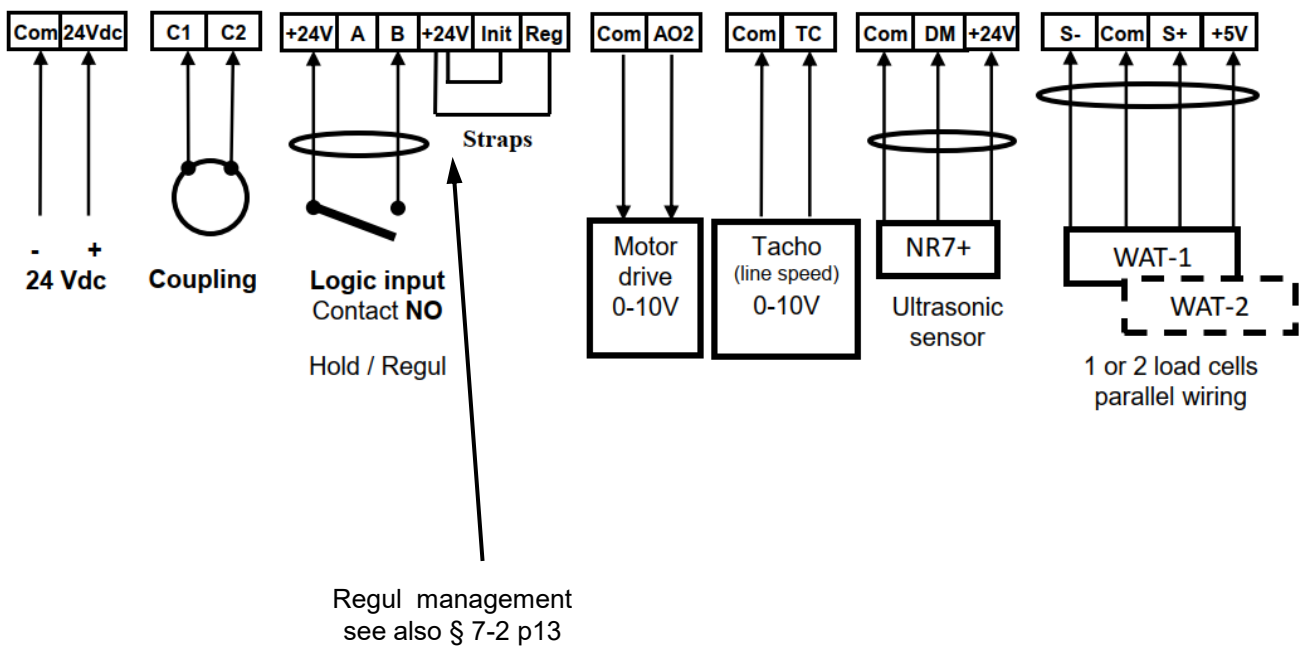
Speed follower solution

Used for rewinding or reversible applications, speed follower function drives both speed with motor and torque with clutch to generate very smooth control on the tension combined with a limited slipping speed in the clutch eliminating then heat dissipation issues.



06-1

Wiring



06-2

Starting parameter set

DISPLAY	Ligne 1	Setpoint
	Ligne 2	Measure
PROCESS	Time delay start	1
	Time delay stop	300
	Hold	10
INPUTS	Max effort	
	Set point value	50
	Diameter filtering	1000
	Ligne speed filtering	100
OUTPUTS	Upper limit	10
	Bottom limit	0
	Power output gain	100
REGULATION	P	100
	I	20
	D	0
	Measure filtering	100
	Open loop coefficient	0
	Close loop coefficient	100
	Speed gain	Calcul 1
	Speed coefficient	0
	Overspeed	Calcul 2

06-3 **Formula Regulation / Speed Gain =**
$$\frac{10 \cdot V_L}{V_R}$$

06-4 **Case : line speed with 0-10 V tacho signal**

Inputs : COM / TC

V_L (mpm) = linear speed for 10 V in tacho input

V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO2 output (or 10V on motor drive input))

06-5 **Case : line speed with encoder (pulses) signal** 

Inputs : COM / LS – see wiring p13

V_L (mpm) = linear speed for encoder signal = 30 kHz

V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO2 output (or 10V on motor drive input))

06-6 **Formula Overspeed =**
$$\frac{S_s \times AO2_{max}}{V_R}$$

S_s (rpm) = clutch slipping speed (60rpm recommended)

$AO2_{max}$ (V) = Max voltage output on AO2 (usually 10V)

V_R (rpm) = V_R (rpm) = Max rotation speed of the motor (equivalent rotation speed with 10V sur AO2 output (or 10V on motor drive input))

06-7 **Calibration**

Diameter calibration

> See p2

Load cell calibration

> See p6

Set point definition

> See p6

Definition inputs / outputs

➤ See p6

Special functions

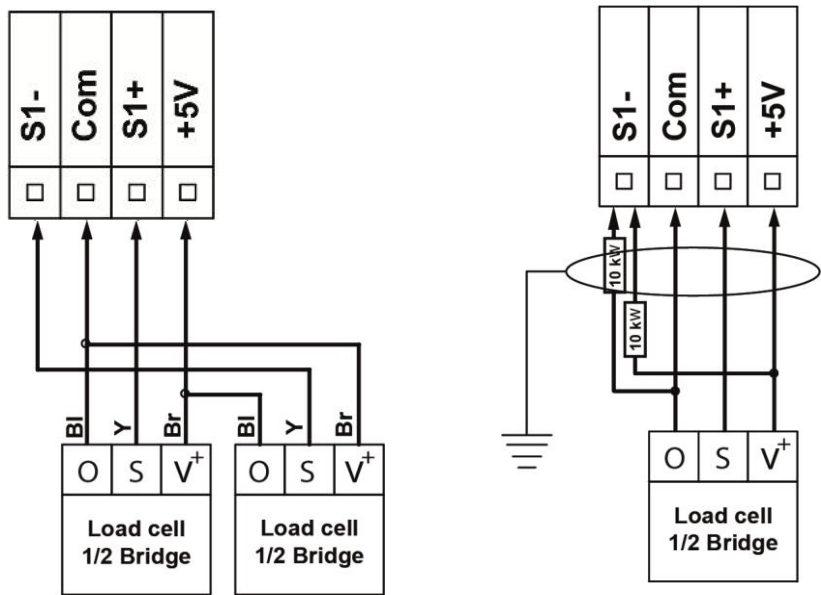
> See p6

07

Complementary wiring diagram

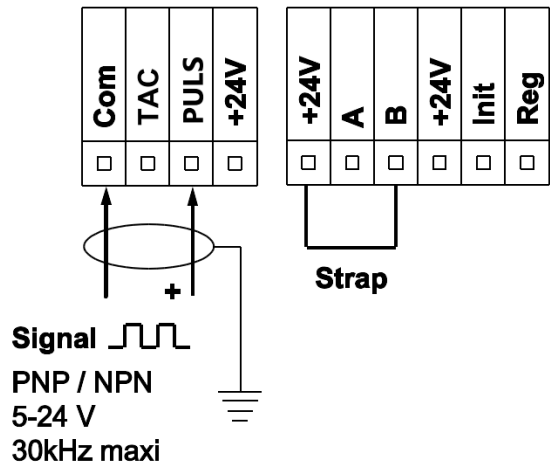
07-1

Other load cells configuration



07-2

Auto / manu (hold) management with encoder line speed selection



07-3

Wiring of A B Init Reg logical input in standard mode (out of No-stop function)

Logic A & B : process management
Logic Init & Reg : PID regulation management

A	B	AO1 Output
0	0	HOLD
0	1	REGUL
1	0	FREE WHEEL
1	1	STOP

Init	Reg	PID calculation
0	0	calculation stopped
1	0	calculation initialization
0	1	calculation running
1	1	calculation running

Note

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