MEROBEL

Case Studies

DGT300$^{\oplus}$

REDEX
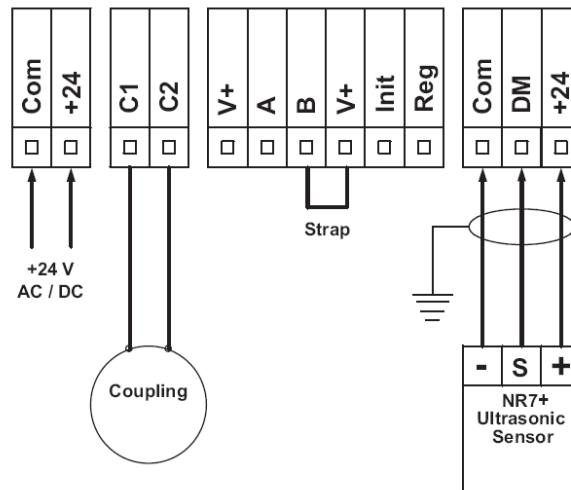Great achievements start with us

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.
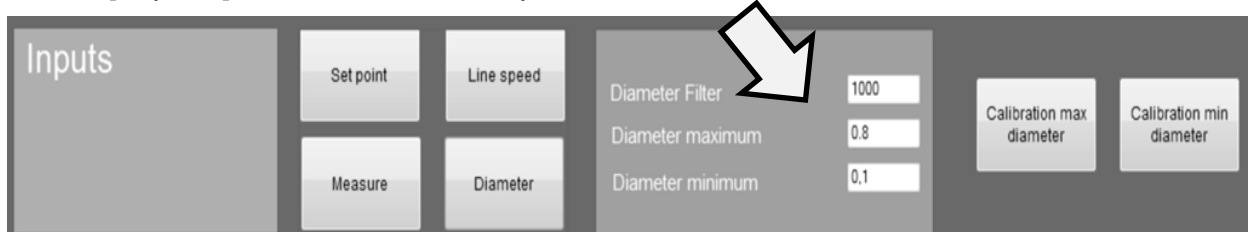
01-1 Wiring

01-2 Starting parameter set

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

Calibration

1 - Calibration sensors US & Laser

Select [Inputs] > Diameter and set parameters data

Inputs						
	Set point	Line speed	Diameter Filter	1000	Calibration max diameter	Calibration min diameter
			Diameter maximum	0.8		
	Measure	Diameter	Diameter minimum	0,1		

Send parameters to Memory (M1 à M5)

Data				M1	M2	M3	M4	M5

■ Simulate max diameter of the roll
click [**Calibration max diameter**]
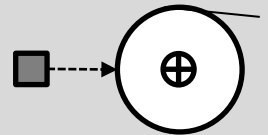
■ Simulate min diameter of the roll
click [**Calibration min diameter**]

■ 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 **?**)
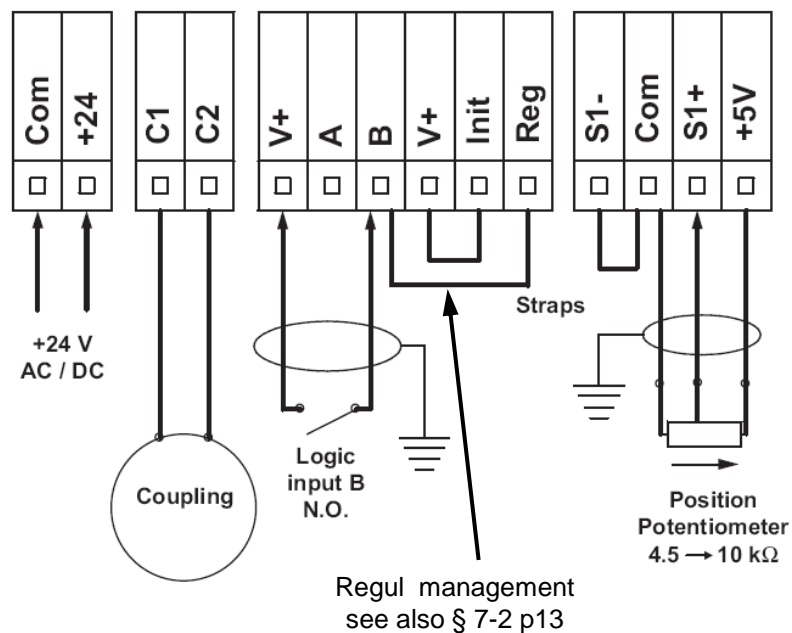
02

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
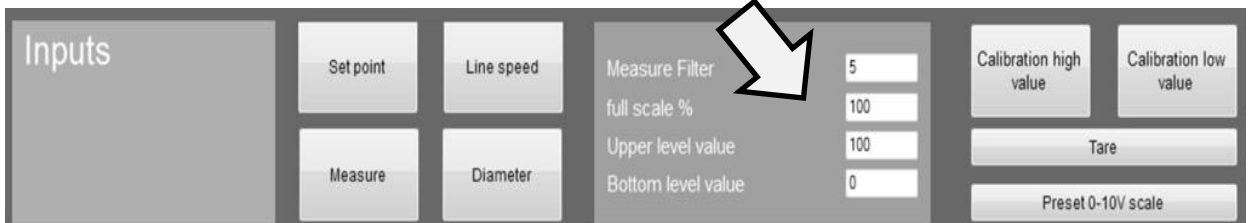dancing roller at the same intermediate position.

02-1 Wiring

Regul management
see also § 7-2 p13

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	0
	Bottom limit	10
	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

Calibration

1 - Calibration of dancer position

Select [Inputs] > Measure and set parameters data

Inputs					
	Set point	Line speed	Measure Filter	5	Calibration high value / Calibration low value
			full scale %	100	
			Upper level value	100	Tare
	Measure	Diameter	Bottom level value	0	Preset 0-10V scale

Send parameters to Memory (M1 à M5)

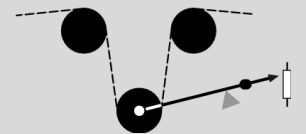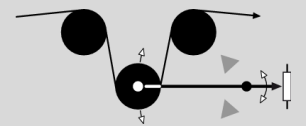| Data		💾	DGT300⊕	M1	M2	M3	M4	M5

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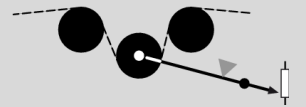
- Position dancer in bottom position
  click [**Calibration low value**]

- 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.

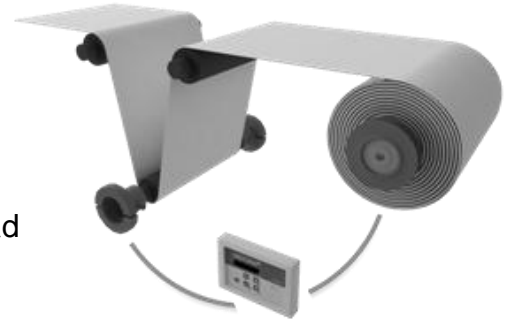### 4 – Power output (brake and clutch current setting)
See -> Menu [Output] > power C1 C2 and set relevant power output gain

5 – Special functions
Details of all special functions (taper, Estop…) necessary to your application are available in Help menu (click on icon [?])

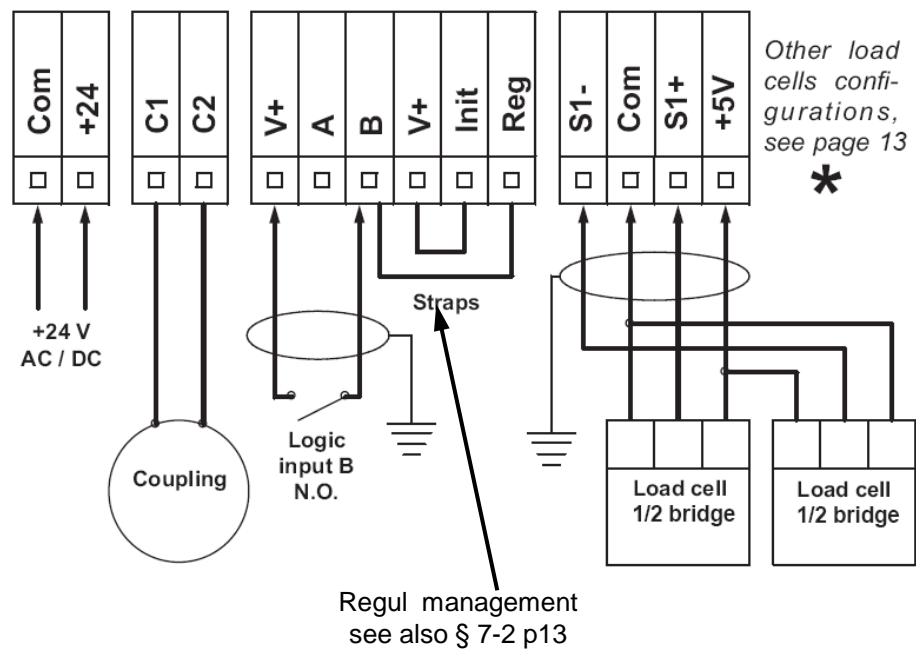## 03 Tension control with load cells → Closed loop control

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

Other load cells configurations, see page 13

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+24 V AC / DC

Coupling

Logic input B N.O.

Straps

Load cell 1/2 bridge

Load cell 1/2 bridge

Regul management see also § 7-2 p13

03-2 Starting parameter set

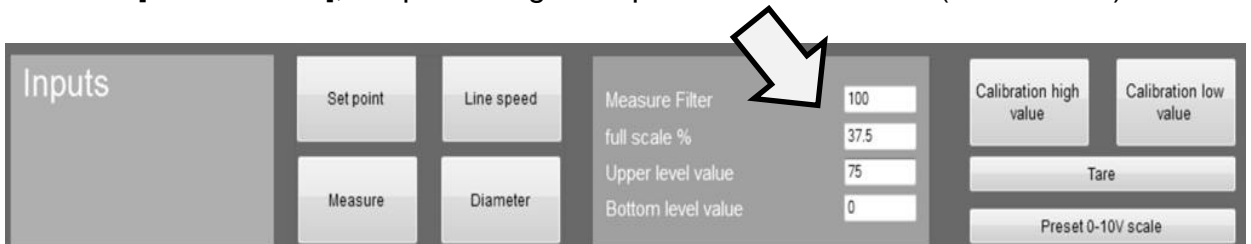| DISPLAY	Ligne 1	Setpoint
	Ligne 2	Measure
PROCESS	Time delay start	1
	Time delay stop	300
	Hold	10
INPUTS	Max effort	
	Set point value	50
	Diameter filtering	
	Ligne speed filtering	
OUTPUTS	Upper limit	0
	Bottom limit	10
	Power output gain	100
REGULATION	P	100
	I	20
	D	0
	Measure filtering	100
	Open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

Calibration

1 - Calibration load cell measurement

Select [Inputs] > Measure and set parameters data

Enter calibration weight value : [Upper level value] (here75N)
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
			full scale %	37.5		
	Measure	Diameter	Upper level value	75	Tare	
			Bottom level value	0	Preset 0-10V scale	

Send parameters to Memory (M1 à M5)

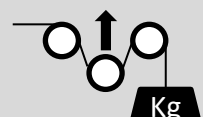| Data				M1	M2	M3	M4	M5

- Simulate the load with a string following the product path
  and hang the weight.
  click [**Calibration high value**]
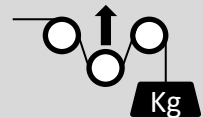
- Remove the load and any stress on the load cells
  click [**Calibration low value**]
  →Calibration done

- 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   **?**   )

DGT300⊕

04 Motor application unwind / rewind solution

Control tension solution with motor speed drive.
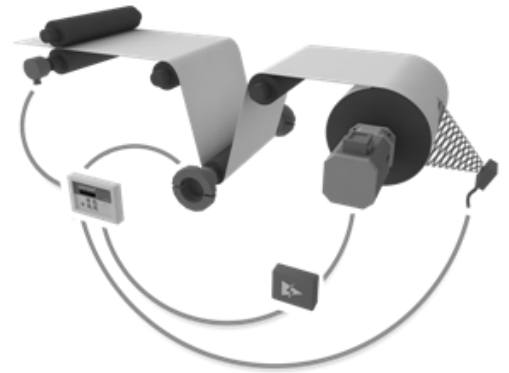
04-1 Wiring
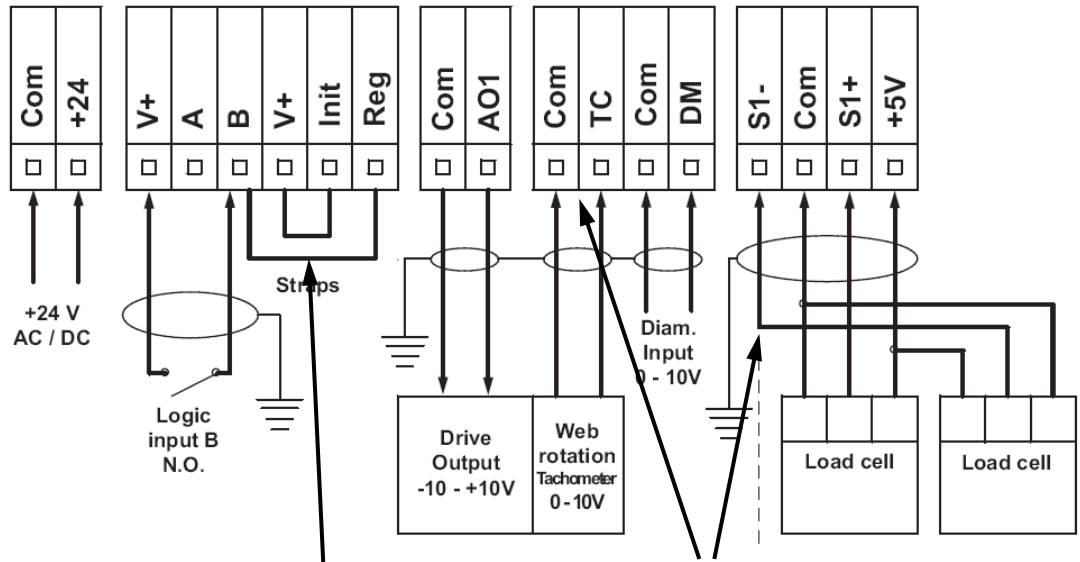
Regul management
see also § 7-2 p13

Other load cells and
line speed wiring
see p 13

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	0
	Bottom limit	10
	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 =** $\dfrac{V_L}{10\ V_R}$

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

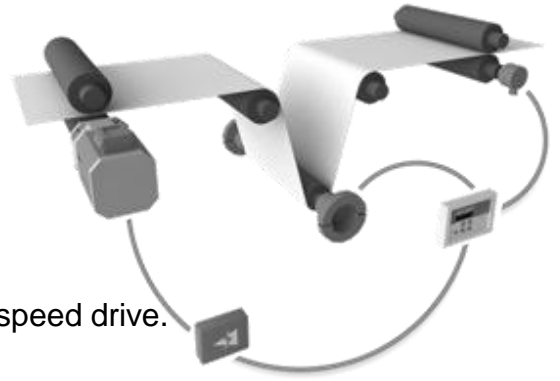**Definition inputs / outputs**
➢See p6

Special functions
> See p6

05

Motor application
Infeed / outfeed solution
(intermediate tension control)

Intermediate tension control solution with motor speed drive.

05-1   Wiring

Com	+24		V+	A	B	V+	Init	Reg		Com	AO1		Com	TC	Dm	+24v		S1-	Com	S1+	+5V
□	□		□	□	□	□	□	□		□	□		□	□	□	□		□	□	□	□

Straps

+24 V
AC / DC

Logic
input B
N.O.

Drive
Output
-10 - +10V

Web
rotation
Tachometer
0 - 10V

Load cell   Load cell

Regul management
see also § 7-2 p13

Other load cells and
line speed wiring
see p 13

05-2   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	0
	Bottom limit	10
	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

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

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

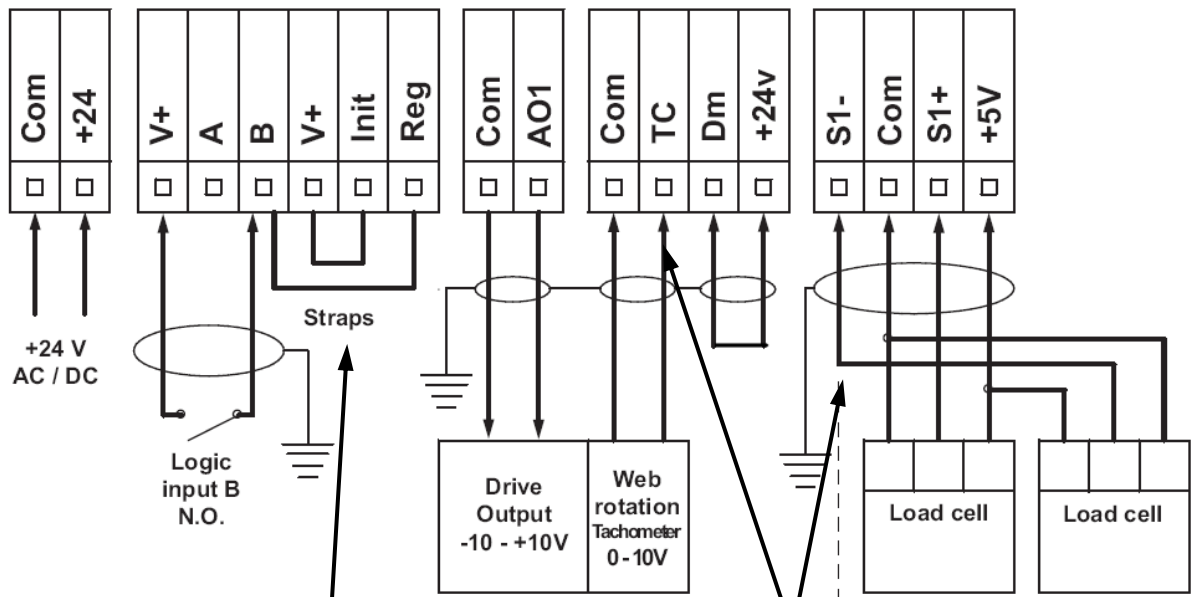**Definition inputs / outputs**
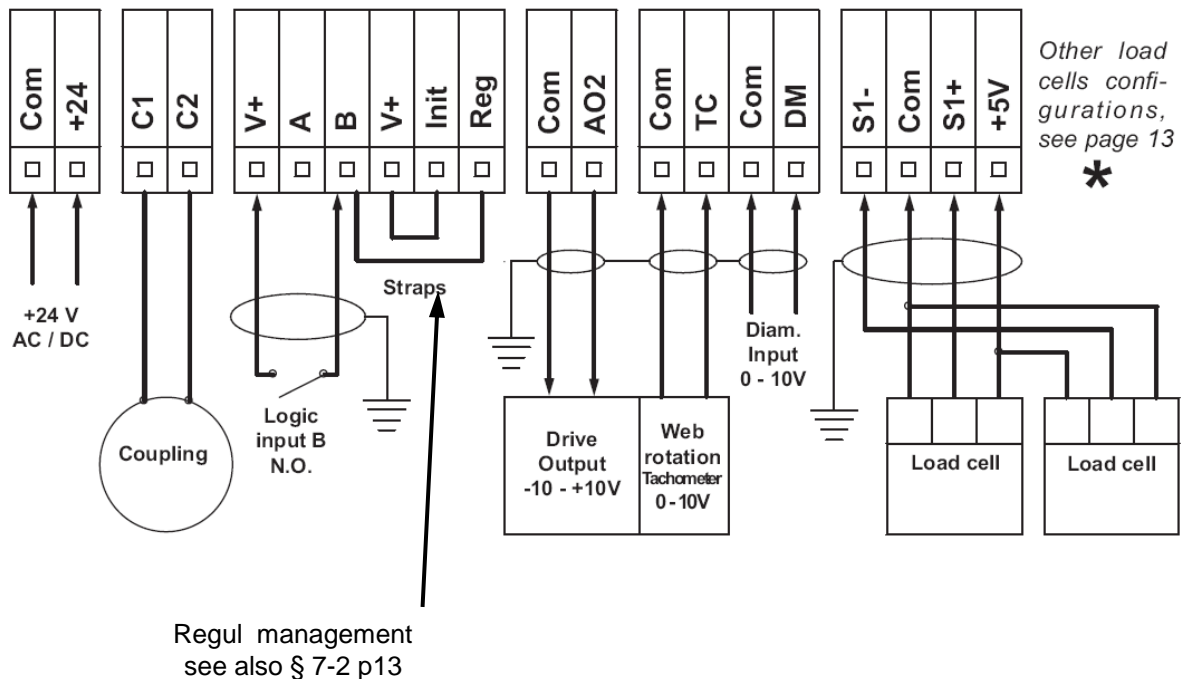➢See p6

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

| Com | +24 | C1 | C2 | V+ | A | B | V+ | Init | Reg | Com | AO2 | Com | TC | Com | DM | S1- | Com | S1+ | +5V |

+24 V
AC / DC

Coupling

Logic input B N.O.

Straps

Drive Output -10 - +10V

Web rotation Tachometer 0 - 10V

Diam. Input 0 - 10V

Load cell

Load cell

Other load cells configurations, see page 13 ✱

Regul management see also § 7-2 p13

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	0
	Bottom limit	10
	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 =** $\dfrac{V_L}{10\,V_R}$

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 AO1 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 AO1 output (or 10V on motor drive input))

06-6 **Formula Overspeed =** $\dfrac{S_S \times AO2_{max}}{V_R}$

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 AO1 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

- 0 + V Full bridge Load cell
- 0 + V Full bridge Load cell

10 kΩ
10 kΩ

Load cell 1/2 bridge
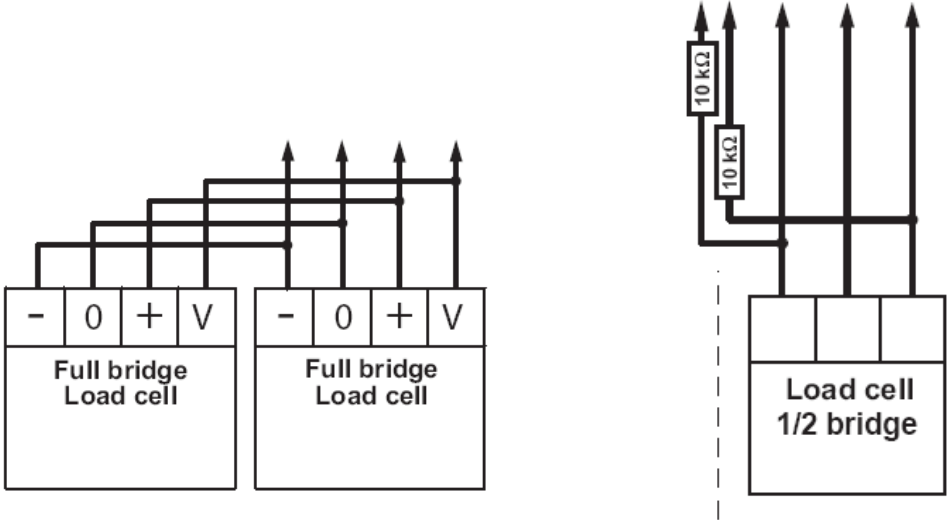
07-2 Auto / manu (hold) management with encoder line speed selection

| Com | TC | LS | +24V | V+ | A | B | V+ | Init | Reg |

Strap

+

Signal ⊓⊔⊓
PNP / NPN
5-24 V
30kHz maxi

DGT300

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Note

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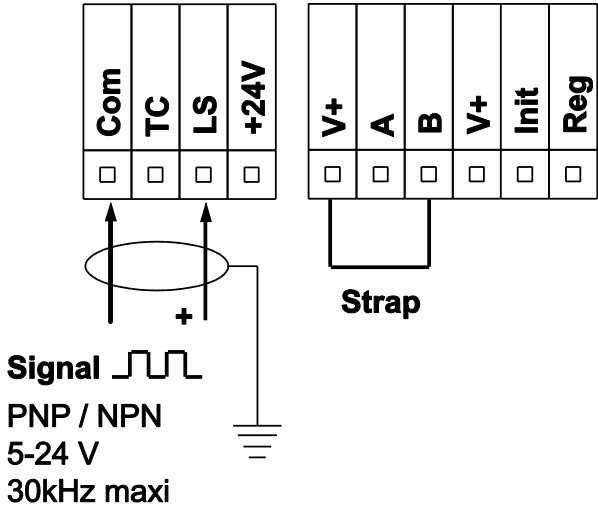
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