TORQUE & TENSION CONTROLS

REDEX
Group

www.redex-group.com

EMP Brakes & Clutches,
Torque limiters,
Controllers,
Load cells & Torque sensors

MEROBEL
Torque & Tension

MEROBEL : A BRAND OF THE REDEX GROUP...

A European Group, a Global presence

Structured as an **European and international company** (selling its products to over 50 countries), REDEX Group global organization includes:

• **3 service centers**,
• **8 subsidiaries**,
• and a **large network of specialized agents** to offer its **customers** and **partners** service and support all around the world
REDEX Group European orientation has been further strengthened by the integration over the past 10 years of BÜHLER GmbH, UNGERER GmbH & BWG technologies.

With more than **160 years of combined expertise** in its core specialties, REDEX Group carries 30 active patents and dedicates an average of 8% of its turnover to **innovation and R&D**.

Focused on industrial B2B, its global organization relies on European top management and teams to offer the best services in design, manufacturing, sales & technical support.

REDEX Group is specialized in supplying advanced solutions for high precision industries, REDEX Group is a technical leader in each of its high demanding specialties : **Machine Drives, Precision Rolling Mills and Strip Processing Technologies**.

... AND A WORLD LEADER IN ITS KNOWHOW

Torque & Tension Control

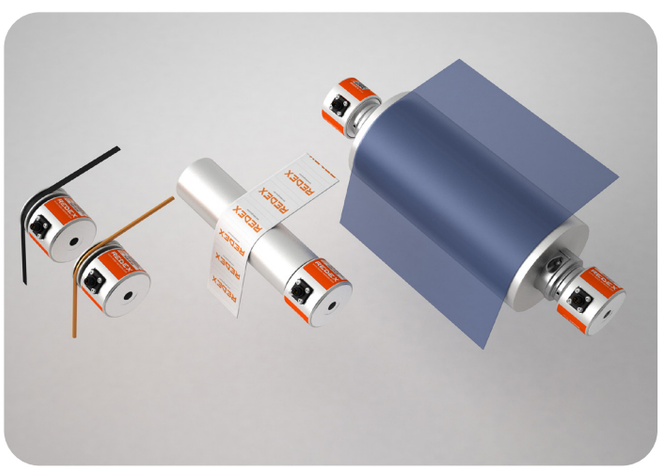
As a well known supplier of EMP brakes and clutches for many years, with the MEROBEL Torque & Tension brand, REDEX Group gained a vast field of experience for unwind / intermediate / rewind industrial applications for papers, foils, fibers, wire and cable.

Using this experience, engineering team developed a range of controllers that meet all the needs of torque and tension applications.
Always focussed to develop easy and user friendly solutions, controllers are designed with USB port and free software to ease the setting up and commissioning. Connection with the automation world (HMI, PLC) is accessible thanks to open communication with the ethernet port.

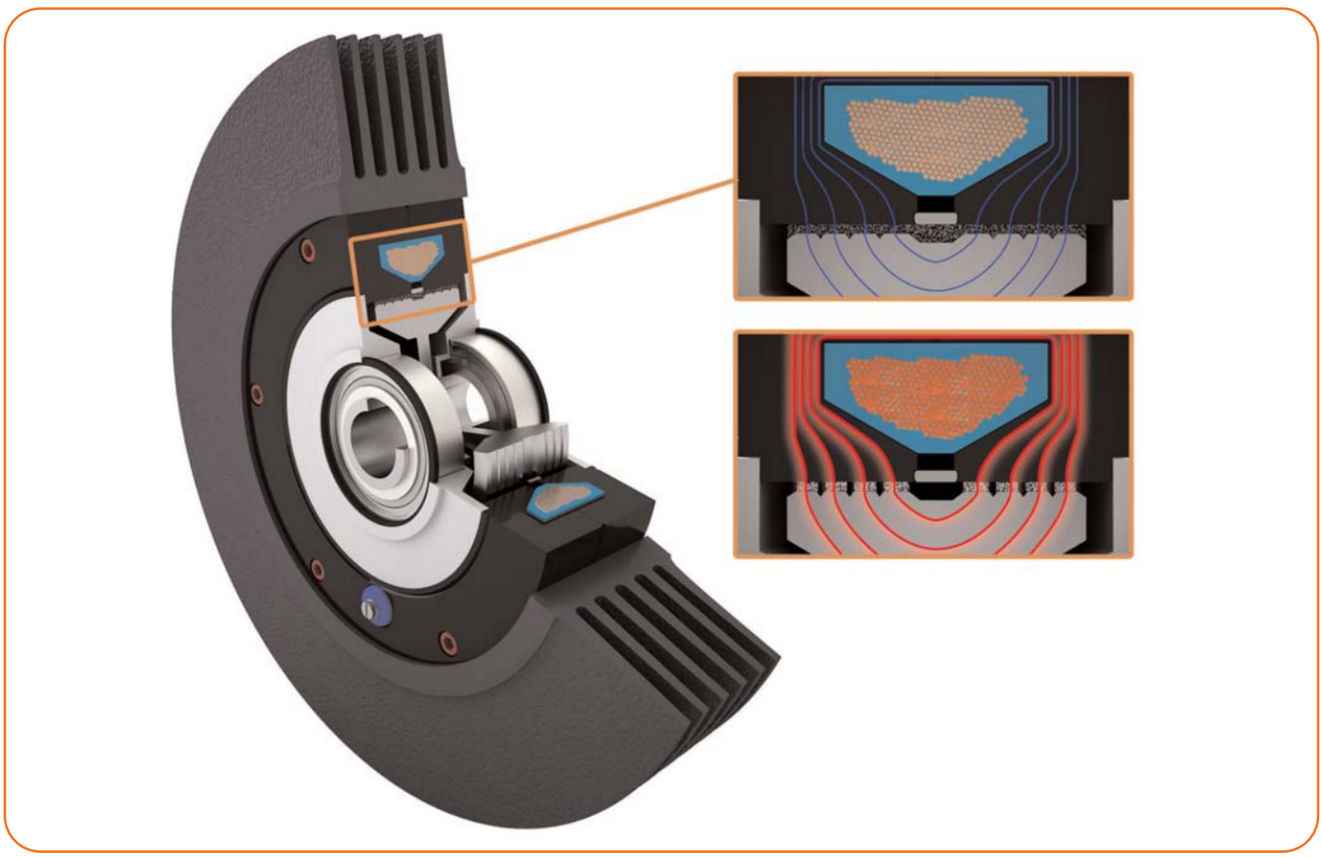
With the addition of the load cells, torque sensors and sensors, complete tension control solution are offered in many different industries such as :

- Converting,
- Printing,
- Packaging,
- Composites,
- Wire & Cable,

but also for torque cycle simulations in test benches (motors, gearboxes, actuators, mechanical parts).



EMP TECHNOLOGY



PRINCIPLE

The EMP powder reacts to the variation of a magnetic field generated by an electro-magnetic coil.

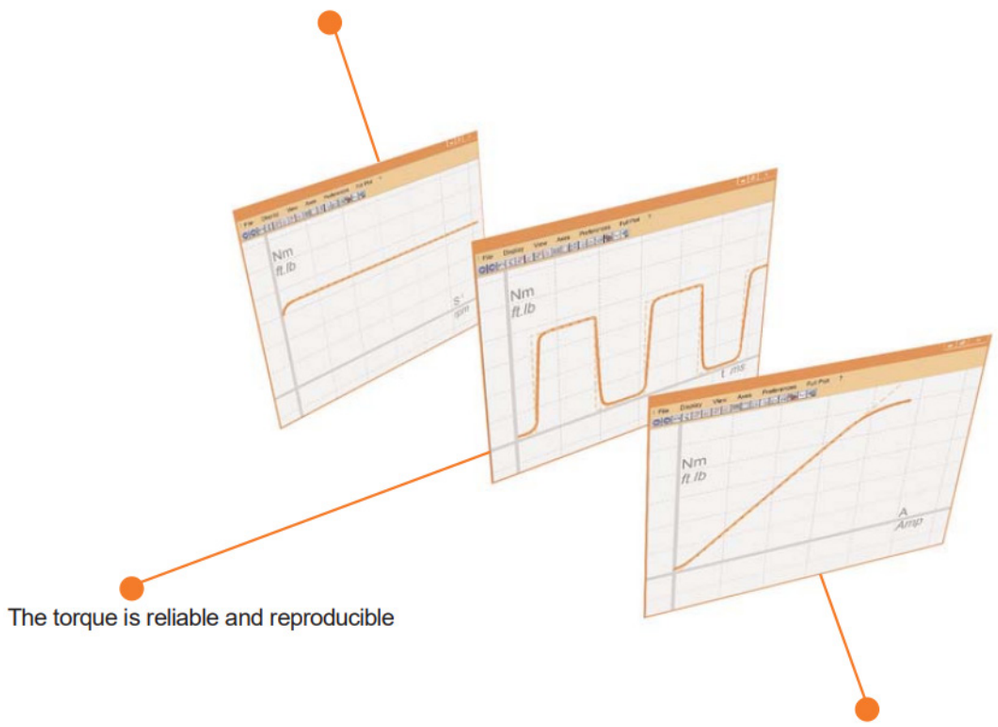
Varying the powder's "viscosity" leads to the control of the torque transmission between the primary and the secondary rotors.

When the secondary rotor is fixed to the equipment frame, the device is acting as a brake, otherwise it's acting as a clutch.

EMP TECHNOLOGY

OFFERING THE BEST TORQUE CONTROL QUALITY

The torque is independent of slip speed.



The torque is reliable and reproducible

The torque variation is linear and proportional to the electric current.

ADDITIONAL BENEFITS

- WIDE TORQUE RANGE
- ELECTRIC LOW POWER CONSUMPTION
- EASY INSTALLATION
- ABILITY TO WORK IN BOTH DIRECTION (CW- CCW)
- CLEAN TECHNOLOGY : NO DUST EMISSION
- SILENT

PRODUCT RANGE

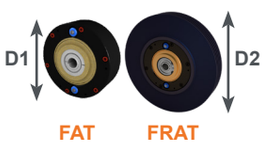
Through bore Brakes

The most popular range of MEROBEL's EMP Brakes, offering tailored solutions for every need with:
- 10 sizes
- up to 5 different versions for each size (heat dissipation options).

Especially designed to be easily installed on Converting, Printing, Wire & Cable, and Packaging machines to name a few.

Cost effective solution for variable torque simulation systems (automotive and aeronautic test benches).

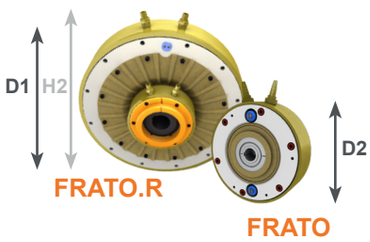
	FAT	FRAT	Torque (Nm)		Coil	Nominal current	Rotor Inertia	Max speed	Power dissipation (W)			
Size	Reference		Min	Max	Ohm	Amp	kg.mm²	rpm	FAT	FRAT	FVAT	FVRAT
FAT 20	ME314320-00	ME314325-00	0.04	2	24	0.4	16	3000	40	60	X	X
FAT 20.RR	ME314370-00	ME314360-00	0.08									
FAT 50	ME313920-00	ME313920-00	0.2	5	24	0.5	99	3000	70	100	X	X
FAT 50.RR	ME313927-00	ME313927-00	0.4									
FAT 120	ME321300-00	ME321400-00	0.27	12	23	0.55	250	3000	75	150	X	650
FAT 120.RR	ME321330-00	ME321440-00	0.56									
FAT 350	ME321700-00	ME321800-00	0.33	35	19	1	790	3000	100	210	500	1400
FAT 350.RR	ME321730-00	ME321801-00	0.66									
FAT 650	ME322100-00	ME322200-00	0.63	65	20	1	2k	3000	150	350	700	1800
FAT 650.RR	ME322110-00	ME322230-00	1.3									
FAT 1200	ME317400-00	ME322600-00	1.2	120	12.5	1.1	26.5k	2000	300	550	1400	2000
FAT 1200.RR	ME317430-00	ME322620-00	2.4									
FAT 2002	ME330200-00	ME330210-00	2	200	11	1.55	35.2k	2000	400	700	1800	2000
FAT 2002.RR	ME330201-00	ME330211-00	4									
FAT 3500	ME126170-00	ME126338-00	3.5	350	10	1.5	89k	2000	470	950	X	3300
FAT 3500.RR	ME127679-00	ME128507-00	7									



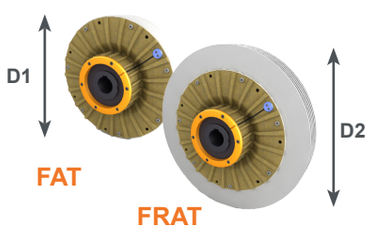
Ø ext	FAT20	FAT50	FAT120	FAT350	FAT650	FAT1200	FAT2002	FAT3500
D1 (mm)	70	93	114.5	135.5	157.5	252.5	278	315
D2 (mm)	110	140	198	238	278	390	390	500

PRODUCT RANGE

Through bore Water Cooled and “High Torque” Brakes



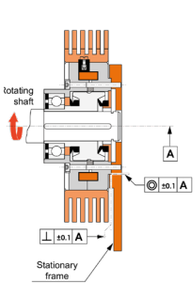
Ø ext	FRATO650	FRATO2002	FRATO5001	FRATO10001
D1 (mm)	175	306	457	570
H2 (mm)	208	339	490	603

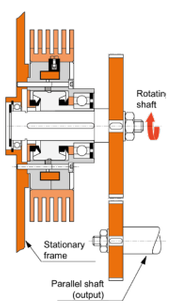


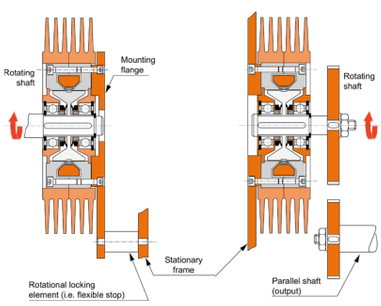
Ø ext	FRAT5001	FRAT10001
D1 (mm)	430	550
D2 (mm)	600	720

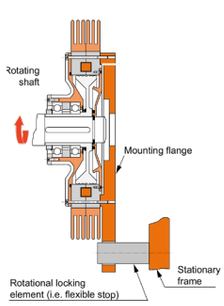
Watcer cooled & big brakes		Torque (Nm)		Coil	Nom current	Rotor Inertia	Max speed	Power dissipation
Reference		Min	Max	Ohm	Amp	kg.mm²	rpm	W
FRATO 650	ME322500-00	65	65	19	1	790	3000	2000
FRATO 2002	ME330240-00	200	200	11	1.55	35.2	2000	2500
FAT 5001	ME330900-00	500	500	11	1.7	331k	1500	1000
FRAT 5001	ME330910-00							1800 (4500)*
FRATO 5001	ME330940-00							4500
FRATO 5001R	ME330950-00							8000
FAT 10001	ME331200-00	1000	1000	20	1.7	809k	1000	1700
FRAT 10001	ME331210-00							3000 (7000)*
FRATO 10001	ME331240-00							5000
FRATO 10001R	ME331250-00							10000

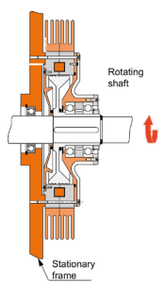
*FVRAT air cooled solution





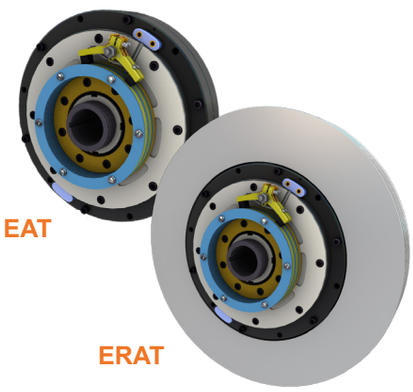






PRODUCT RANGE

Through bore Clutches

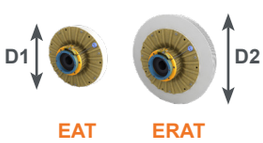


MEROBEL's EMP Clutch series are dedicated to applications where speed and torque need to be independently controlled (a solution which cannot be achieved with a single motor).

Built by adding slip rings and brushes to the through bore brakes, this range of devices offers two different heat dissipation versions for each size (with or without cooling fins).

	EAT	ERAT	Torque (Nm)		Coil	Nom current	Rotor Inertia	Max speed	Power dissipation (W)	
Size	Reference		Min	Max	Ohm	Amp	kg.mm²	rpm	EAT*	ERAT*
EAT 20	ME314330-00	ME314335-00	0.04	2	24	0.4	16	3000	125 @2000rpm	180 @2000rpm
EAT 20.RR	ME314360-00		0.08							
EAT 50	ME313930-00	ME313935-00	0.2	5	24	0.5	99	3000	165 @2000rpm	360 @2000rpm
EAT 50.RR	ME313932-00	ME129790-00	0.4							
EAT 120	ME321500-00	ME321600-00	0.27	12	23	0.55	250	3000	310 @2000rpm	1050 @2000rpm
EAT 120.RR	ME321340-00	ME321620-00	0.56							
EAT 350	ME321900-00	ME322000-00	0.33	35	19	1	790	3000	400 @2000rpm	1450 @2000rpm
EAT 350.RR	ME321740-00	ME322001-00	0.66							
EAT 650	ME322300-00	ME322400-00	0.63	65	20	1	2k	3000	650 @2000rpm	2250 @2000rpm
EAT 650.RR	ME322340-00	ME322350-00	1.3							
EAT 1200	ME317410-00	ME322800-00	1.2	120	12.5	1.1	26.5k	2000	975 @1050rpm	2100 @1050rpm
EAT 1200.RR	ME317450-00	ME322801-00	2.4							
EAT 2002	ME330220-00	ME330230-00	2	200	11	1.55	35.2k	2000	1000 @1050rpm	2500 @1050rpm
EAT 2002.RR	ME330223-00	ME330225-00	4							
EAT 3500	ME126445-00	ME126454-00	3.5	350	10	1.5	89k	2000	1250 @1050rpm	3300 @1050rpm
EAT 3500.RR	ME129863-00	ME132209-00	7							

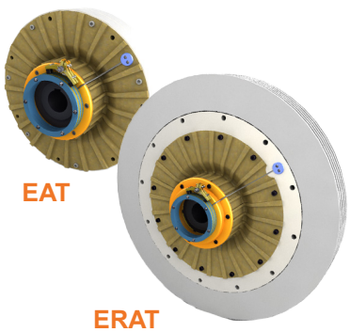
* external rotor rotating @ max rpm

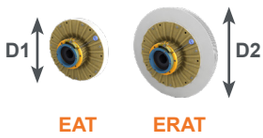


Ø ext	EAT20	EAT50	EAT120	EAT350	EAT650	EAT1200	EAT2002	EAT3500
D1 (mm)	70	93	114.5	135.5	157.5	252.5	278	315
D2 (mm)	110	140	198	238	278	390	390	500

PRODUCT RANGE

Through bore High Torque Clutches



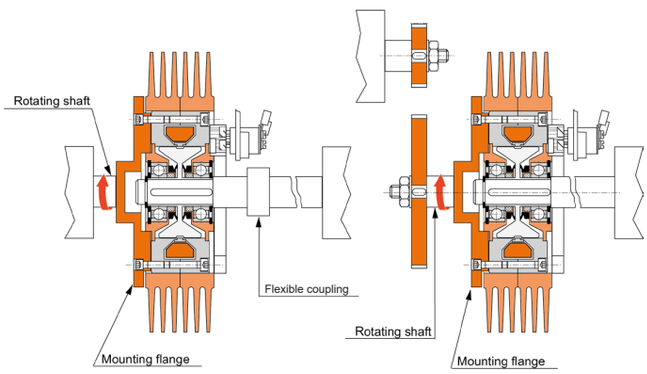


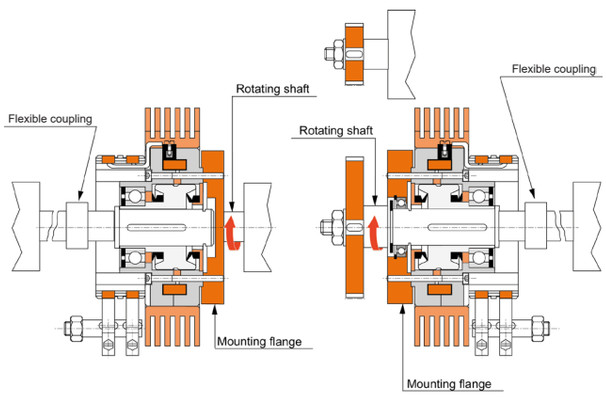
Ø ext	EAT5001	EAT10001
D1 (mm)	430	550
D2 (mm)	600	720

Big brakes	
Reference	
EAT 5001	ME330920-00
ERAT 5001	ME330930-00
EAT 10001	ME331220-00
ERAT 10001	ME331230-00

Torque (Nm)		Coil	Nom current	Rotor Inertia	Max speed	Power dissipation
Min	Max	Ohm	Amp	kg.mm²	rpm	W
500	500	11	1.7	331k	1500	1600 @1000rpm
						3000 @700rpm
1000	1000	20	1.7	809k	1000	2100 @500rpm
						3500 @350rpm

* external rotor rotating @ max rpm





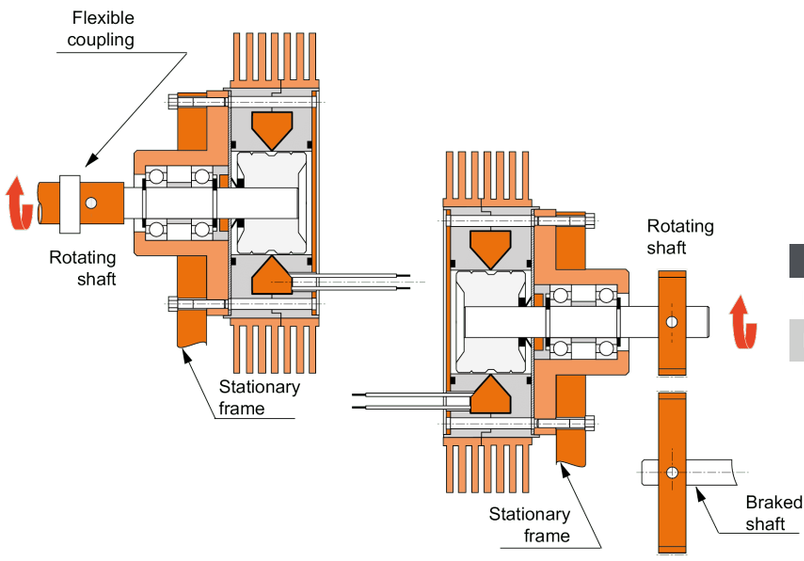
PRODUCT RANGE

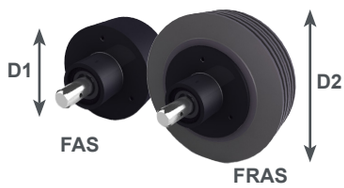
Output shaft Brakes

Compact and very easy to use for applying a variable torque to a rotational system, such as a bobbin directly attached to a shaft, or a small motorized device to be loaded.

MEROBEL's EMP output shaft series are typically used in industrial applications such as wire and cable tension control systems, narrow ribbon unwinding processes, small device automatic test rigs, and more...

	FAS	FRAS	Torque (Nm)		Coil	Nom current	Rotor Inertia	Max speed	Power dissipation (W)	
External shaft	Reference		Min	Max	Ohm	Amp	kg.mm²	rpm	FAS	FRAS
FAS 2 M	ME337800-00	ME337801-00	0.2	0.2	195	0.05	0.8	3000	15	25
FAS 21 M	ME339000-00	ME339100-00	2	2	31	0.45	35	3000	35	60
FAS 50 M	ME338200-00	ME338250-00	5	5	24	0.52	44.5	3000	50	85





Ø ext	FAS2M	FAS21M	FAS50M
D1 (mm)	45	135.5	157.5
D2 (mm)	75	238	278

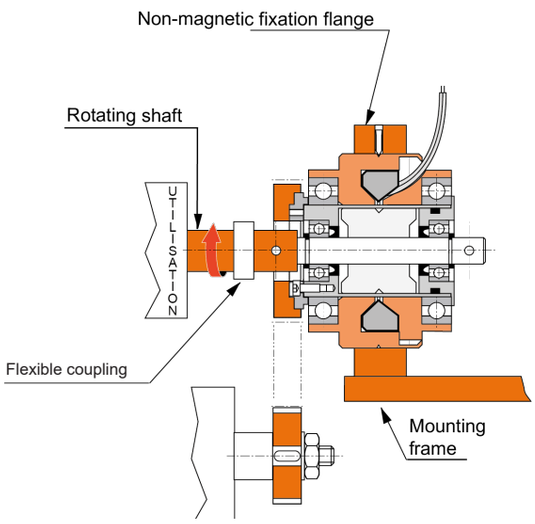
Brushless Clutches

EFAS

The fixed coil design offers very easy mechanical integration into machine designs.

These devices are particularly useful when speed and torque need to be independently controlled at the same time.

	EFAS	Torque (Nm)		Coil	Nom current	Inertia	Max speed	Power dissipation
External shaft	Reference	Min	Max	Ohm	Amp	kg.mm²	rpm	W
EFAS 2	ME323400-00	0.2	0.2	82	0.21	0.8	3000	12
EFAS 10	ME3233501-00	1	1	54.4	0.48	25	3000	20
EFAS 17	ME323601-00	1.7	1.7	37	0.57	7.8	3000	30
EFAS 50	ME321201-00	5	5	24	0.65	37	3000	50



EFAS

Ø ext	EFAS2	EFAS10	EFAS17	EFAS50
D1 (mm)	37	52	60	80

PRODUCT RANGE

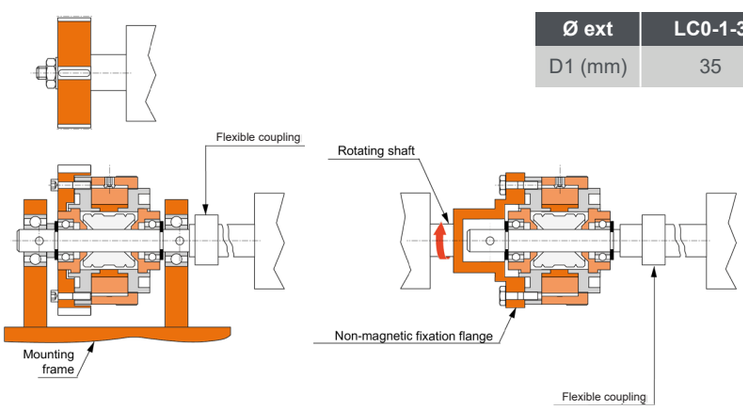
Torque limiters

LC

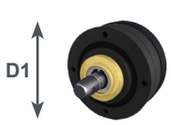
Compact and very easy to use for applying a variable torque to a rotational system, such as a bobbin directly attached to a shaft, or a small motorized device to be loaded.

MEROBEL's EMP output shaft series are typically used in industrial applications such as wire and cable tension control systems, narrow ribbon unwinding processes, small actuator or motor test rigs, and more...

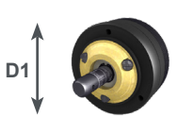
Torque Limiters	Reference	Torque (Nm)		Int. rotor Inertia	Ext. rotor Inertia	Power dissipation
		Min	Max	kg.mm²	kg.mm²	W
LC 0	ME807326-01	0.02	0.06	0.59	16	8
LC 1	ME807326-02	0.05	0.15	0.59	16	8
LC 3	ME807326-03	0.12	0.3	0.59	16	8
LC 10	ME807341-01	0.3	1	29	390	25
LC 20	ME807341-02	0.6	2	29	390	25
LC 50	ME807355-01	2	6	210	600	75
LC 100	ME807355-02	4	12	210	600	75
LC 150	ME806208-01	5	15	23k	120k	500
LC 300	ME806208-02	15	40	23k	120k	500
LC 500	ME806208-03	25	65	23k	120k	500
LC 700	ME806208-04	30	85	23k	120k	500



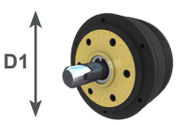
Ø ext	LC0-1-3	LC10-20	LC50-100	LC150-300-500-700
D1 (mm)	35	62	110	260



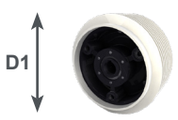
LC-0-1-3



LC10-20



LC-50-100



LC150-700

PRODUCT RANGE

LC.CS

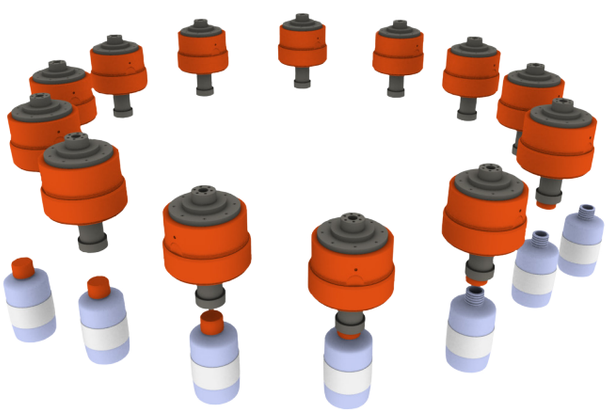
Especially designed for capping application, LC.CS series benefits from the reinforced sealing (*) & corrosion protection surface treatment. Capping head or coupling can be directly mounted on the fixing nozzle, with a compressed air supply provided through the hollow shaft.

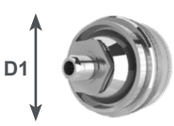
Smooth and stepless transmission is guaranteed in any mounting position.

(*) : high pressure wash down is not compatible with this technology

Torque Limiters	Reference
LC 10CS	ME807341-14
LC 20CS	ME807341-13
LC 30CS	ME807341-15

Torque (Nm)		Int. rotor Inertia	Ext. rotor Inertia	Power dissipation
Min	Max	kg.mm²	kg.mm²	W
0.3	1	29	390	25
0.6	2	29	390	25
1.2	2.4	29	390	25





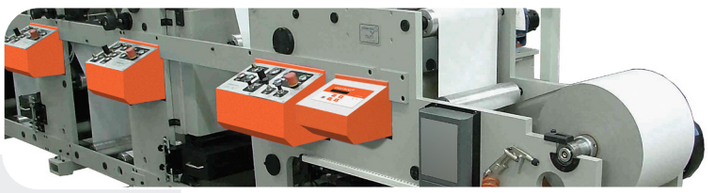
LC.CS

Ø ext	LC10CS-20CS-30CS
D1 (mm)	62

APPLICATIONS

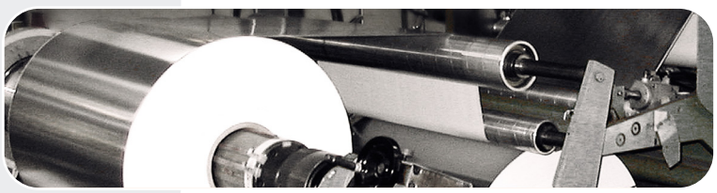
WEB TENSION CONTROL

Foil unwinding



MEROBEL solutions offer the best cost to performance ratio with the simplest installation and setup procedures.

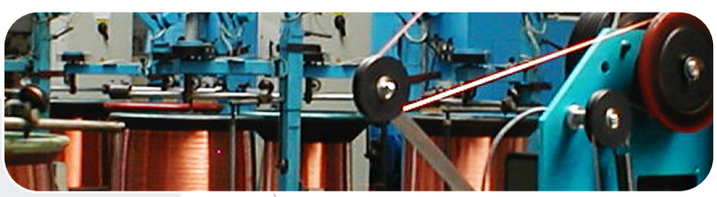
Using MEROBEL solutions provides real advantages when tension accuracy is crucial for web unwinding and rewinding applications.



Converting, Printing, Labelling, Packaging, Textile, Composites, battery, etc.

WIRE & CABLE TENSION

Filament unwinding

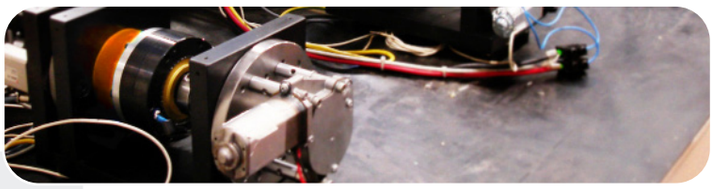


MEROBEL's EMP technology is the modern solution for unwind stands, flyers, or wire tensioners, to ensure accurate tension control in the Wire & Cable industries.

Wire and Cable industry, Coil and Filaments Winding, High Tech Textile, Tires, etc.

APPLICATIONS

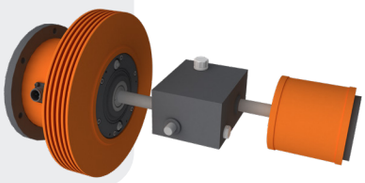
TEST BENCHES



Load simulation for test benches.

Smooth variation and quick response time make MEROBEL EMP brakes the ideal technology to create closed loop controlled simulation of variable torque on industrial test rigs.

High reliability and compact design are just a few of the advantages offered for this type of application.



ACCURATE TORQUE CONTROL

Packaging, precision screw tightening, capping, accurate torque limitation, simulators and all other demanding industries.

Smooth and progressive variation of the torque, accuracy and compactness, low power consumption, and long life without maintenance, are some of the most important features which make MEROBEL EMP Brakes essential wherever accurate torque control is required.

SELECTION & SIZING

SIZING

Like any technical product, MEROBEL EMP Brakes & Clutches must be properly sized to achieve outstanding durability without maintenance.

TORQUE

The sizing is primarily achieved by comparison of the required torque to the rated torque ranges.

T_{max} [Nm] = F_{max} [N] . R_{max} [m]
T_{min} [Nm] = F_{min} [N] . R_{min} [m]

Note : mechanical Inertia effects may have to be considered when evaluating the max torque

POWER DISSIPATION

Brakes and Clutches create heat. The amount of the heat created must be compared to the power dissipation capability of the unit to ensure that the maximum operating temperature is not exceeded.

P[W] = T [Nm] .ω [rd/s]
with **ω = π . n [rpm] / 30**

Note 1: a gear ratio should be considered to avoid oversizing the unit when the maximum torque becomes the primary selection parameter.

Note 2: the max. power shown on the device specification sheet is given for an ambient temperature of 20°C.
For higher ambiet temperatures, the power dissipation should be reduced accordingly.

ROTATION SPEED

The maximum rotating speed is mechanically limited (unbalanced effects, centrifugal force, and ball bearing sizing).
The minimum speed is given to avoid any possible “clogging” effect when there is compliance in the transmission system.

n_{max} and n_{min} [rpm] are shown on the devices specification sheets.

Note : when the required speed is lower than the minimum speed shown on the specification sheet, the remnant rotor version (RR) can be possible solution. Many parameters may allow lower and higher speeds to be acceptable.
When facing these limitations, please consult your local supplier.

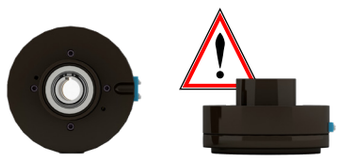
Specific formulas to be used for unwind / rewind applications are given in the Tension Control chapter
(see p 16).

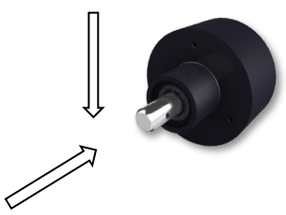
SELECTION & RECOMMENDATION

MOUNTING POSITION

EMP Brakes and Clutches are primarily designed to be installed with the shaft horizontal.

However, the vertical shaft position is possible by using a remnant rotor version or keeping a small current permantently applied to the coil.
If facing this type of application, please consult your local supplier.





AXIAL & RADIAL FORCES

Internal ball bearings are designed to support only the weight of Brakes/Clutches rotating parts.
Any extra force (i.e. : high load on the shaft) has to be managed by an external mechanical assembly.

MAINTENANCE - LUBRICATION

The ball bearings of the EMP Brakes and Clutches are lubricated with high temperature grease for life.
The EMP Brakes and Clutches are maintenance free for years when sized correctly and used under normal conditions.

Never Insert or spray any oil or grease inside or onto the devices, as it may seriously affect their performance.

TEMPERATURE

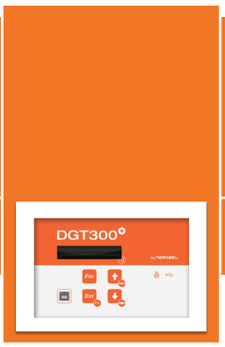
External temperature of the devices is determined by the addition of the ambient temperature plus the temperature rise created by its operation (related to the braking principle which converts the mechanical power into thermal power).

MEROBEL's EMP Brakes & Clutches exclusive design allows an external temperature up to 100°C, without jeopardizing the performance or lifetime.

ELECTRICAL SUPPLY

In order to create the needed continuous magnetic field which will generate the torque, the coils of MEROBEL's EMP Brakes and Clutches have to be supplied with only DC current.

Since the coil resistance is a function of the device's internal temperature, it is strongly recommended to use MEROBEL's current regulated power supply to ensure the constant current.



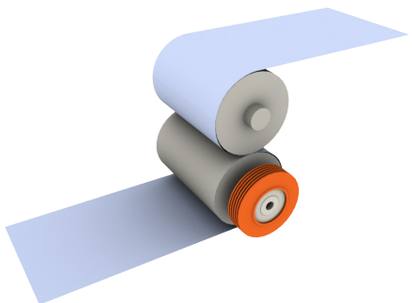
AN INTRODUCTION TO TENSION CONTROL

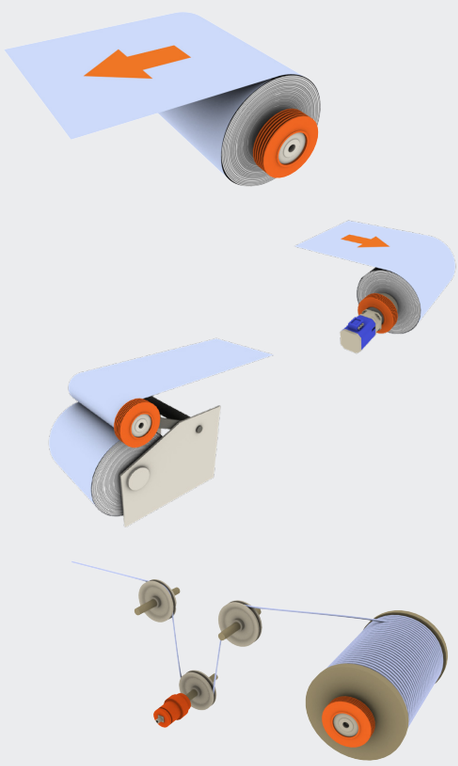
Tension Control (Web, Foil, Fiber, Wire & Cable)
Principles & Solutions

As a well known supplier of EMP Brakes and Clutches for many years, MEROBEL gained vast field experience for unwind / rewind industrial applications for papers, foils, composites, wire and cable.

Utilising this experience, MEROBEL's engineering team developed a range of user friendly controllers that meet all the needs of unwind / rewind applications.

With the addition of the proper load cells and sensors, MEROBEL offers a complete tension control solution to many industries such as Converting, Printing, Wire & Cable, Packaging, etc.





TENSION CONTROL: A CRUCIAL ISSUE !

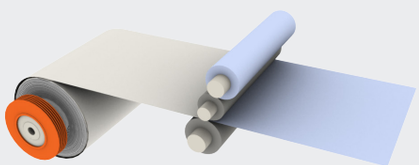
To control a web, cable, or wire all along an industrial process, requires the product to be kept "in tension" when going over each of the rolls to manage the product elongation and to keep it as constant as possible.
It's also a way to keep it aligned and to help the internal speed conrols at each stage of the machine.

Either for designing new equipement or for upgrading an old machine, the final success expected from the Tension Control system relies heavily on the analysis which leads to the right selection of the best components.

To help with this analysis, the following chapter introduces first the calculations to be made for sizing the Brakes and Clutches in the Tension Control environment; and second all the different regulation systems and specific functions available from MEROBEL's product range.

APPLICATIONS - INDUSTRIES

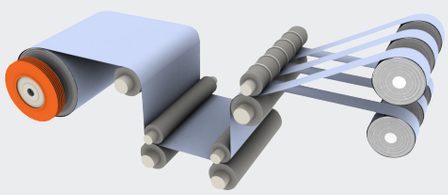
PRINTING, CONVERTING, LABELLING, PACKAGING INDUSTRIES...

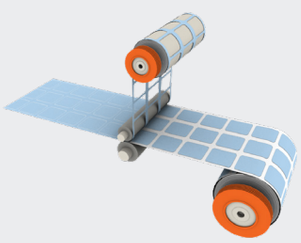


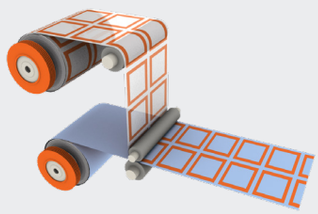
MEROBEL's creative engineering team can help with the most challenging Web Tension Control Applications.

Whatever the application, an easy-to-use, easy-to-install and complete cost effective solution is offered.

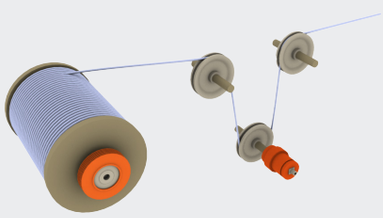
The solution combines high quality, reilability, short delivery, and efficient technical support.



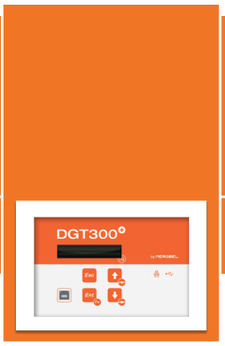




WIRE & CABLE INDUSTRIES



MEROBEL's EMP technology is the modern and cost effective solution for unwind stands, flyers, or wire tensioners, to ensure accurate tension control in the Wire & Cable industries.



TENSION CONTROL - CALCULATIONS & SIZING

REQUIRED PARAMETERS

Sizing optimization requires preliminary calculations based on the following parameters:

Max Force — F_{max} [N]
Maximum force to be applied to the product

Min Force — F_{min} [N]
Minimum force to be applied to the product

Max Diameter — D_{max} [N]
Maximum outside diameter of the full roll

Min Diameter — D_{min} [N]
Core diameter

Max Speed — V_{max} [m/s]
Maximum linear speed of the product

Min Speed — V_{min} [m/s]
Minimum linear speed of the product

Looking for conversion factors, see p.

For highly dynamic applications, the following additional data must be also considered:

Roll weight — M[kg]

Acceleration time — t_a [s]
Time between no speed and full speed

Deceleration time — t_d [s]
Time between full speed and no speed

E-Stop time — t_e [s]
Minimum E-stop time requested

CALCULATION FORMULAS

TORQUE RANGE REQUESTED

Usual tension values: see data charts p.

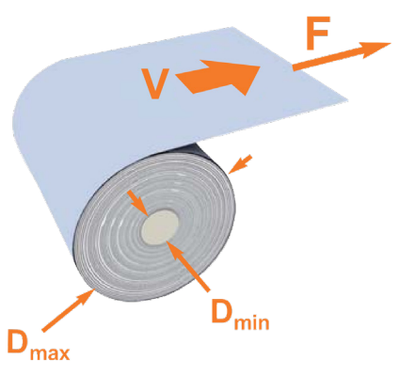
T_{max} [Nm] = F_{max} . r_{max}
T_{min} [Nm] = F_{min} . r_{min}
with **r = D / 2**

MAXIMUM POWER DISSIPATION

P_{max} [W] = F_{max} . V_{max}

ROTATION SPEED RANGE REQUESTED

n_{max} [rpm] ~ 10 . V_{max} / r_{min}
n_{min} [rpm] ~ 10 . V_{min} / r_{max}



ROLL INERTIA

J_{max} [kg . m²] ~ 1/2 . M . r^2_{max}

DYNAMIC TORQUE (Accel. / Decel.)

T_{acc} [Nm] = - J_{max} . (ω_j / t_a)
T_{dec} [Nm] = J_{max} . (ω_j / t_d)
T_{e-s} [Nm] = J_{max} . (ω_j / t_e)

with ω_j [rd.s^{-1}] = V_{max} / r_{max}

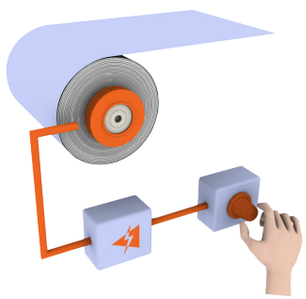
TENSION CONTROL - REGULATION

Principle

The machine operator manually adjusts the output torque of the brake through the current regulated power supply.

Since the roll diameter changes, the operator needs to constantly pay attention and periodically change the set point to minimize the variation in tension.

MANUAL CONTROL



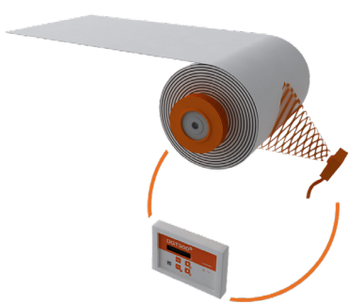
Principle

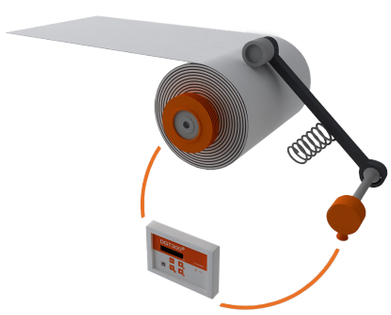
Cost effective and user friendly, these open loop regulation systems are able to maintain a web tension accuracy of about 10%.

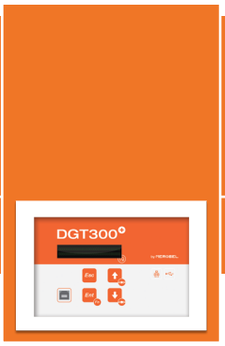
A sensor (Ultrasonic, Laser, or potentiometer) measures the diameter from the external surface of the roll.

The controller makes the calculation to provide the correct torque level according to the diameter, and keeps the tension constant throughout the unwinding process.

DIAMETER MEASUREMENT







TENSION CONTROL - REGULATION

CLOSED LOOP POSITION CONTROL (DANCER)

Principle

The closed loop solution:
The tension on the product is generated by the force applied to the dancer roll (fixed weight or variable pressure from a pneumatic cylinder).

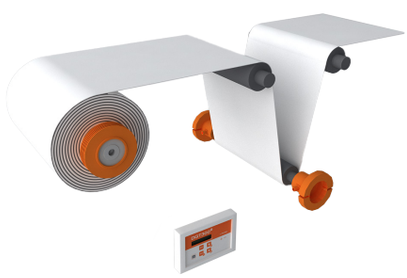
A position sensor (potentiometer) measures the dancer roll position, and automatically adjusts the torque through a PID controller to keep the dancer arm position stable and constant.

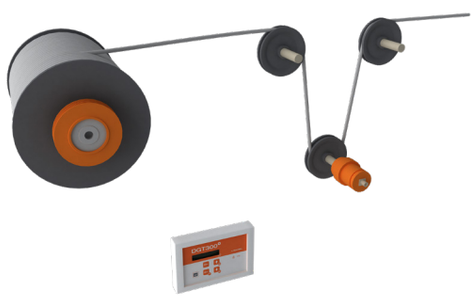
CLOSED LOOP FORCE CONTROL (LOAD CELLS)

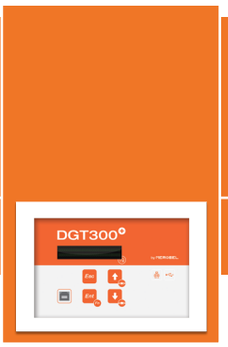
Principle

The ultimate closed loop solution:
The web tension is maintained by continuously monitoring the difference between the tension set point and the load cells measurement feedback.

The torque is automatically adjusted via a PID controller to keep the actual tension at the set point, even during acceleration and deceleration. By design, the actual tension applied to the material is available for display and / or record.







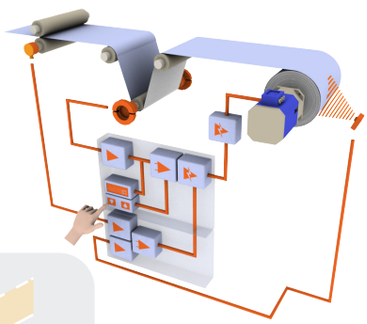
TENSION CONTROL - REGULATION

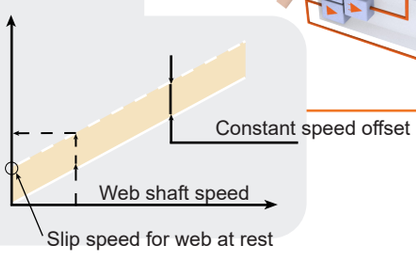
Principle

The state-of-the-art solution when rewinding applications cannot easily deal with a complex mix between torque control and speed control.

As an exclusive feature of MEROBEL's digital controllers, the speed follower takes the full benefit of the EMP technology's smoothness at high and low speed (even at rest), while minimizing the power dissipation required.

SPEED FOLLOWER FOR REWIND APPLICATION

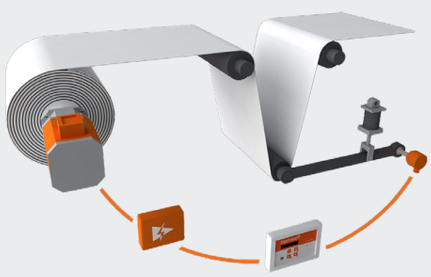




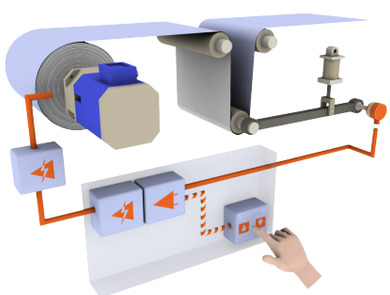
Principle

In addition to the direct control of EMP Brakes and Clutches, MEROBEL's controller design includes a special feature allowing the regulation of external motor drives.

This feature allows the users to benefit from the sophisticated MEROBEL controller's "web tension functions", even when using motors and drives.



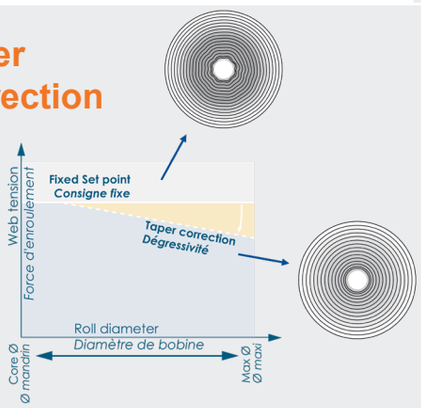
MOTOR & DRIVE



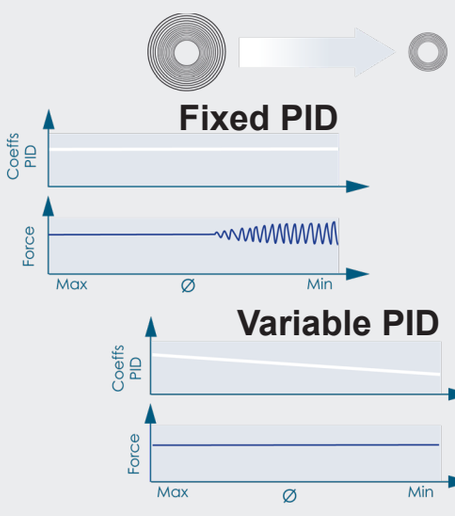
TENSION CONTROL - REGULATION

TENSION CONTROL: ADDITIONAL FUNCTIONS

Taper correction



Non-stop turret unwinder



Many years of experience made MEROBEL capable of resolving the most demanding Tension Control applications.

The built in functions offered provide complete technical solutions to all specific needs in applications such as Converting, Narrow web, Wire & Cable, etc

Taper correction

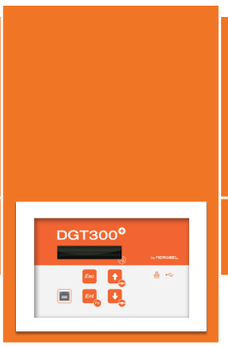
A specific feature that avoids over tension at the center of the roll, by automatically adjusting the set point, as a function of the actual roll diameter.

Non-stop turret unwinder

The controller manages the empty / full web automatic rotation process, switching the regulation from one roll to the other, and maintaining a preset torque on the empty roll.

Variable PID

When the diameter range is very high, this feature automatically adjusts the PID coefficients, according to the actual roll diameter, in order to avoid web tension instability when approaching the core diameter.



TENSION CONTROL - REGULATION

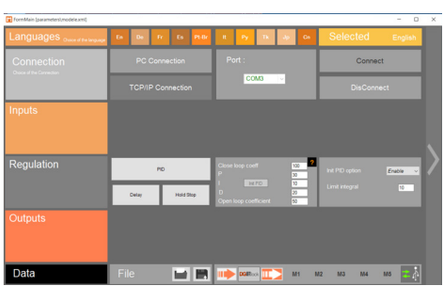
Principle

Developed for multi axis applications, the compact DG BLOCK controller offers a daisy chain mounting simplifying the wiring and the process with the backside connectors dispatching power supply & common process data.

Each axis is individually controlled in closed loop.

CREEL

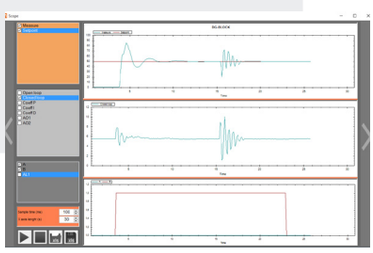
SOFTWARE



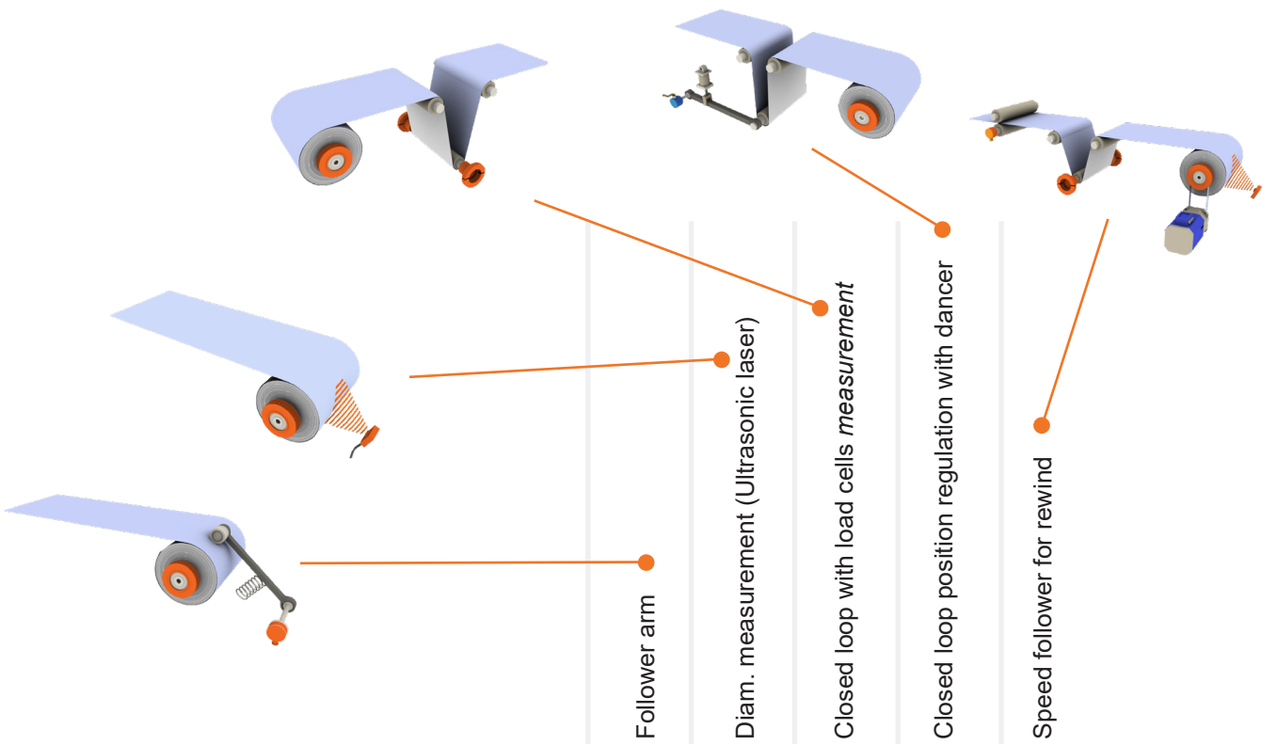
Software

Tension control commissioning is getting easy with the very intuitive and and user friendly programming system. Preset parameters are available to suit all the application types.

Scope function included in the software simplifies greatly the setting up and offers the data logging functions for quality management.



SELECTING THE CORRECT REGULATION SYSTEM



	Follower arm	Diam. measurement (Ultrasonic laser)	Closed loop with load cells *measurement*	Closed loop position regulation with dancer	Speed follower for rewind
Contact with the product prohibited		✓			
Sound & Vibrations absorbent product	✓		✓	✓	
Stop & Go process	✓	✓		✓	✓
Actual Tension monitoring			✓		
Torque & Speed independence					✓

- **Question to ask?**
- **Advice needed?**

MEROBEL engineering team is available to help select the best solution to your specific application. Please consult info@redex-group.com

TORQUE CONTROL - REGULATION

Principle

Torque control is often used in motor drive configuration. This part is treated in tension control chapter page 23.

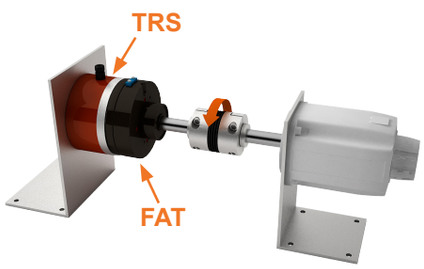
Torque control in this chapter is referring to test bench applications with load simulation for motors or actuators like gearboxes, steering systems…

This type of torque control is necessary at the different stages of a product development for characterization validation, endurance testing or production quality management

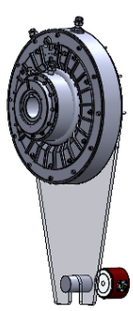
With reproducible and accurate torque, fast response time, easy remote control with low power consumption, EMP brakes offer a modern and cost effective solution.
Combined with TRS static torque sensor for direct torque measurement, simple to sophisticated solutions can be built : manual control with a power supply or closed loop control following duty cycle with DGT300+ or DG-block controller.

Dynamic torque sensors can also be used in combination with both controllers.

TEST-BENCHES



For high torque application (above 200Nm), measurement is done with a moment arm and wat+ load cell.



> Compact & Cost Effective Design

> Suitable for a wide range of coils

> Accurate current output control

The most comprehensive range of **CURRENT REGULATED Power Supplies**, based on micro controller technology.

POWERBLOCK2 +

The universal solution, suitable to the majority of MEROBEL's EMP Brakes and Clutches

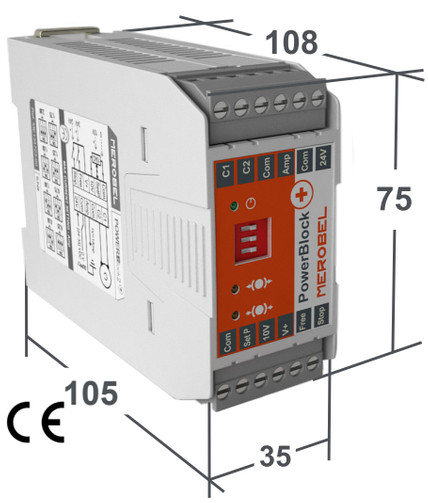
POWERBLOCK4 +

The higher level of output current. Suitable for special coils, or use of devices wired in parallel mode, or other Brake technologies with low impedance coils (i.e. Hysteresis).

POWERBLOCK04 +

Ideal for higher remote control accuracy of Merobel's smallest size EMP Brakes and Clutches or other Brake technologies with high impedance coils (i.e. Hysteresis).

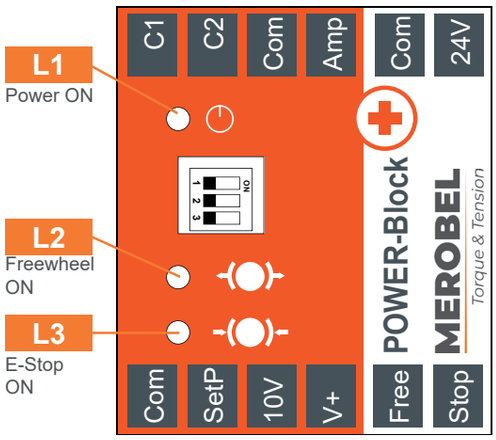
DIMENSIONS



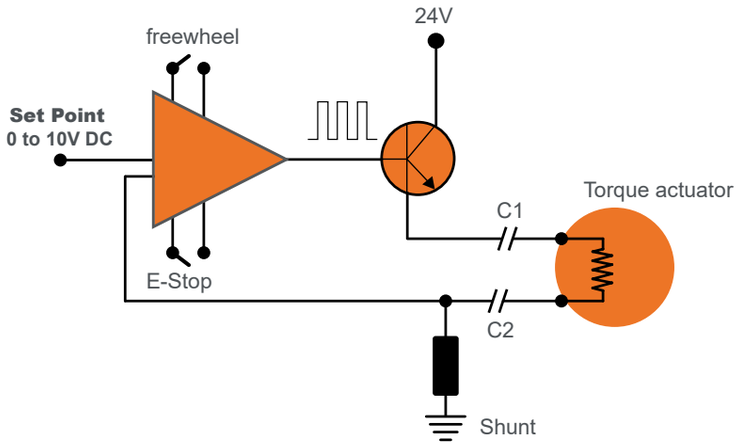
TECHNICAL FEATURES

		Pb2+	Pb4+	Pb04+
Part number	#	ME134723-00	ME134826-00	ME134829-00
Power supply	[V DC]	24 → 35	24 → 30	24 → 35
Max power consumption	[VA]	70	120	20
Output load resistance	[ohm]	5 → 60	1 → 10	20 → 400
Output max current	[A]	2	4	0.4
Remote Setpoint	[V DC]	0 → 10	0 → 10	0 → 10
Ambient temperature	[°C]	+10 ... +40	+10 ... +40	+10 ... +40
Weight	g	120	120	120

SETTINGS



PRINCIPLE

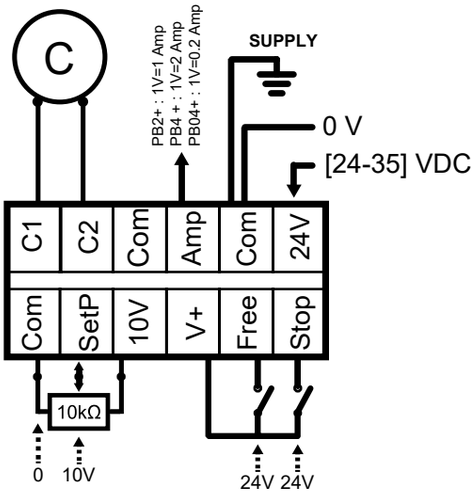


MAX. OUTPUT CURRENT ADJUSTMENT

PB2+		PB4+		PB04+	
0.25A	0.50A	0.50A	1.00A	0.05A	0.10A
0.75A	1.00A	1.50A	2.00A	0.15A	0.20A
1.25A	1.50A	2.50A	3.00A	0.25A	0.30A
1.75A	2.00A	3.50A	4.00A	0.35A	0.40A

Adjust the max current output using the DIP switch positions.
E-Stop value refers to the max current value set with the DIP switches.

CONNECTIONS



C1 / C2	Brake or Clutch Power Supply (C)
Com	0 V
Amp	Real time current equivalent voltage
0 V	Equipotential supply point
24 V	24 V Supply
SetP	Set point input (0 → 10 V DC)
10V	Set point potentiometer supply (10k Ω)
V+	Logic inputs voltage remote control
Free	Logic input “Freewheel” mode (0 Amp)
Stop	Logic input “E-Stop” mode (Max current)*

*(max current with DIP switches)

AMPLI-Block+

Universal Amplifier

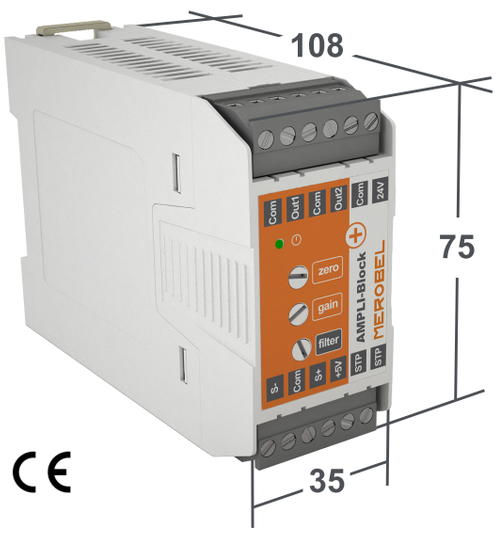
- Wide range of Amplification
- Direct & filtered outputs
- Suitable for foil & semi conductor gauges load cells

AMPLI-Block+, the universal **precision signal amplifier** is designed for simple set up for the use with one or two load cells, either half or full bridge.

AMPLI-Block ⊕

- The universal solution, suitable for one or two load cells.
- Simple set up with zero & gain adjustment (gain x20 to x10000)
- Two levels of gain range to cover any type of transducers
- Direct output signal for fast response time application (motor control)
- Filtered output signal for noise cancelation

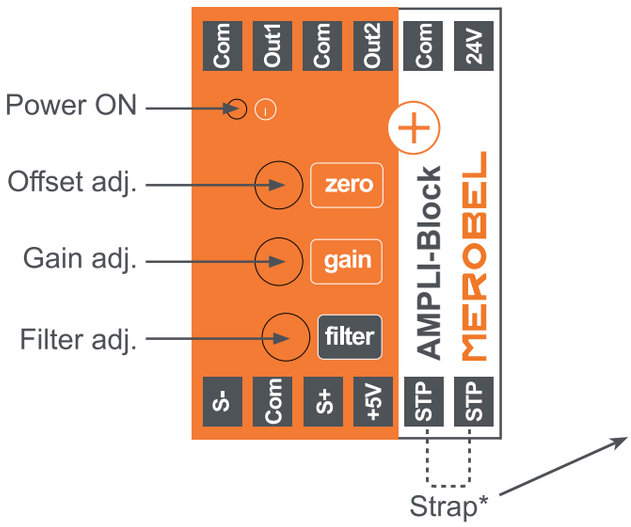
DIMENSIONS



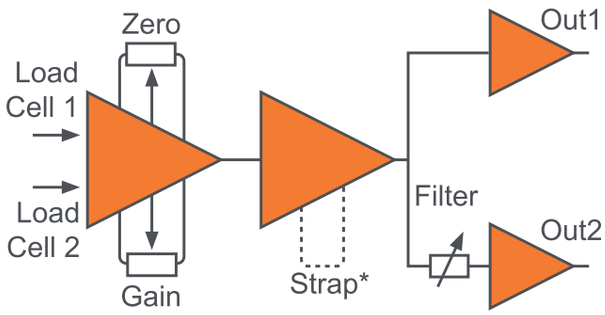
TECHNICAL FEATURES

Part number	#	ME135691-00
Power supply	[V DC]	24 (20 → 35)
Max power consumption	[VA]	3
Strain gauges bridge supply	[V DC]	5
Output voltage	[V DC]	0 → 10
Current (Output voltage)	[mA]	< 5
Zero compensation		± 50% of FS
Ambient temperature	[°C]	0 → +40
Weight	g	120

SETTINGS



PRINCIPLE



No strap → High gain for typical 2mV/V signal and lower
With strap → Low gain for semi conductor gauges typically 50mV/V and higher

CALIBRATION PROCEDURE


No load : set 0v with zero adjustment

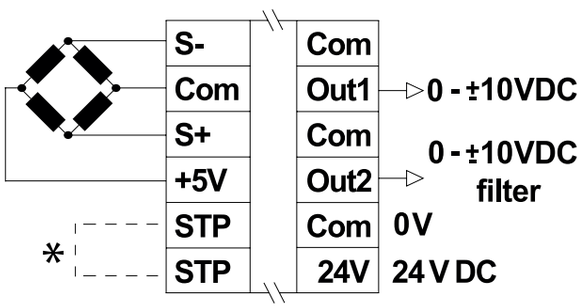

Simulate max load by hanging a weight on a string following the product path.
Set 10v with gain pot adjustment.


Remove load (totally free) and reset 0v with zero pot adjusmtent.


Calibration is done.
Check that voltage follows the weight variation.
It is possible that you need one extra setting to ensure accurate measurement.

CONNECTIONS

Full bridge gauges



Out1	Direct output signal Ua (0 → ±10V)
Out2	Output signal filtered Ub (0 → ±10V)
Com	0 V / Merobel equipotential supply point
24V	Supply : 24 V DC
S-	Signal sensor -
S+	Signal sensor +
+5V	Supply sensor(s)
STP	*Strap for gain selection

DG-Block

Digital Controller

> **Compact and complete solution**

> **Easy set up with software interface**

> **Multi spindle design**

DG-Block is the new benchmark in closed loop **digital controllers** for all industries using equipment managing a large number of wires, cables, fibers or narrow webs.

DG-Block

DG-Block is a true turnkey solution relying on a very intuitive programming system, the user friendly computer software (DG-BlockSoft).

Each block is designed to make a torque & tension control solution with universal amplifier – advanced regulation – brake power supply & analog drive output

Shared process instructions from one leader device to several follower devices, without any extra wiring.

ADVANCED FEATURES OF REGULATION

> Built-in **precision amplifier** for 1 or 2 load cells

> P.I.D **regulation** algorithm

> Open + closed loop modes included

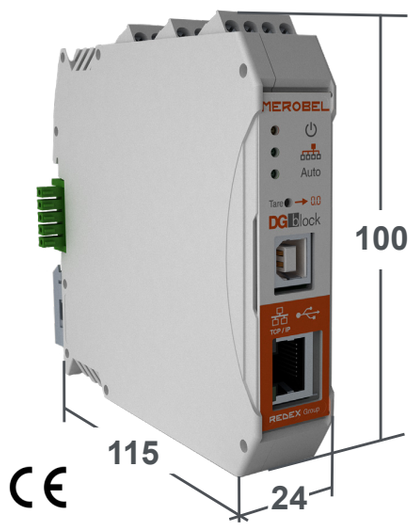
> **Direct power supply** for e-brake

> Very easy set-up with the PC software (Windows)

> Automation communication : MODBUS TCP/IP

> Specifically designed for Mutli spindle applications

DIMENSIONS



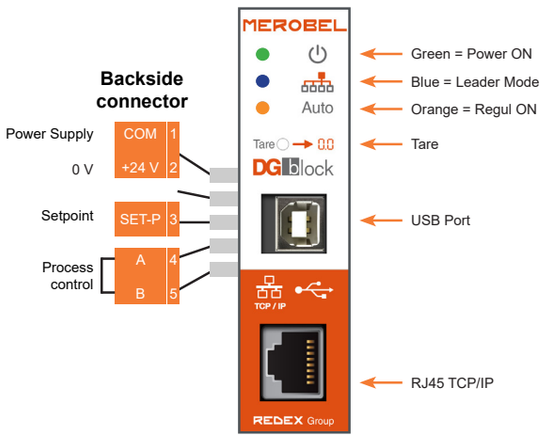
TECHNICAL FEATURES

Part number	#	ME134330-00
Power supply	[V DC]	24 → 35
Max power consumption	[VA]	70
Input measure	[V DC]	1 mV → 10 V
Input set point	[V DC]	0 → 10
Input logics	[V DC]	5 → 24
Output A01 & A02	[V DC]	-10 → +10
Output C1-C2 max current	[A]	1.5
Ambient temperature	[°C]	0 → 40
Weight	g	150

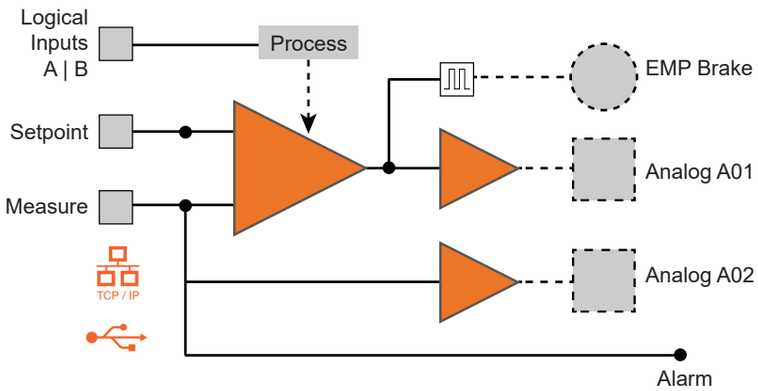
DG-Block

Digital Controller

SETTINGS



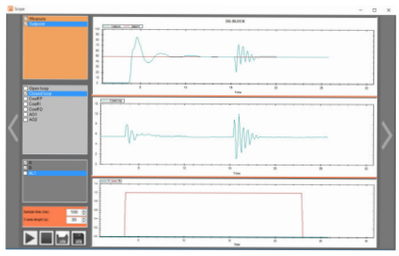
PRINCIPLE



SOFTWARE

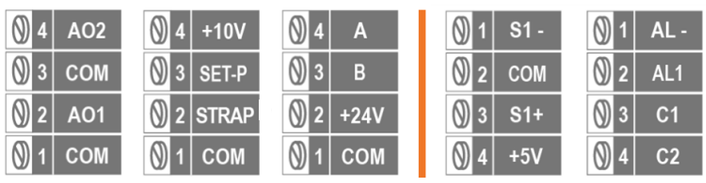
Simple interface with all parameter settings displayed in a unique window

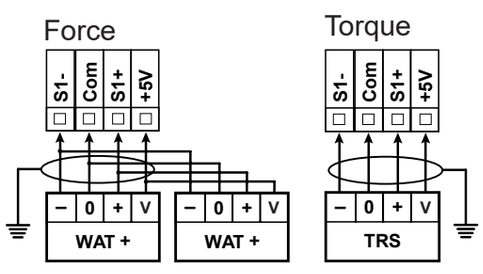
Scope function for easy data readout

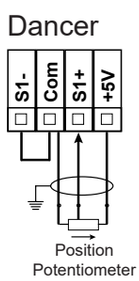


All parameters can also be adressed by modbus TCP/IP with external PLC or HMI.

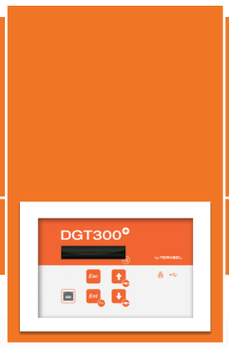
CONNECTIONS







Com	0 V
Strap	Strap to COM to enable leader mode
Set-P	Set point (0-10V or Pot.)
+10V	10V supply
S1-/S1+	Signal (-) / Signal (+)
+5V	Sensor supply
+24V	+24V DC - main supply
C1	Power output direct supply1
C2	Power output direct supply2
AL-	Output logic reference
AL1	Logic output1
A	Logic input 1
B	Logic input 2
AO1	Analog output 1 (-10 → +10V)
AO2	Measure readout (-10 → +10V)



> **All in one solution for web tension & torque control**

> **Dedicated configurations for brakes & motor drives**

> **Enable Set up with its software interface**

DGT300+ is the **Swiss knife controller** able to offer solutions from simple open loop to the most sophisticated control combining speed & torque control.

DGT300+

DGT 300+ is the most attractive turnkey solution on the market for closed-loop / open loop applications used in tension control solutions for winding, unwinding, and intermediate tension control.

DGT 300+ controller is also compatible with demanding torque control solutions for test bench applications.

ADVANCED FEATURES OF REGULATION

> Built-in **precision amplifier** for 1 or 2 load cells

> Automatic variable P.I.D **regulation** function

> Open + closed loop + speed calculation mode

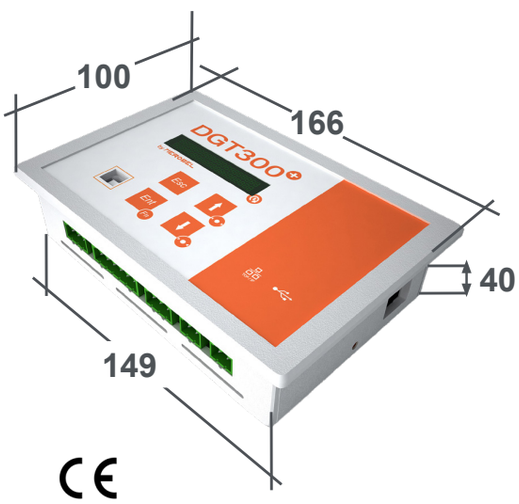
> **Direct power supply** for e-brake

> Very easy set-up with the PC software (Windows)

> Automation communication : MODBUS TC/IP

> Dedicated web tension functions : taper, inertia compensation, no stop...

DIMENSIONS



CE

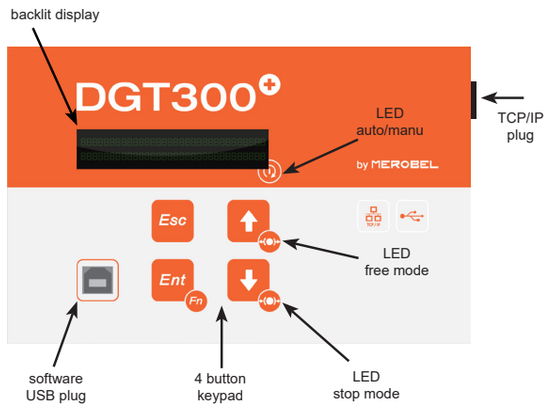
TECHNICAL FEATURES

Part number	#	ME131953-00
Power supply	[V DC]	24 → 35
Max power consumption	[VA]	70
Input measure	[V DC]	1 mV → 10V
Input set point / diameter / tacho [TC]	[V DC]	0 → 10
Input line speed [LS]	[kHz]	30 max
Input logics	[V DC]	5 → 24
Output A01 & A02	[V DC]	-10 → +10
Output C1-C2 max current	[A]	1.5
Ambient temperature	[°C]	0 → 40
Weight	g	400

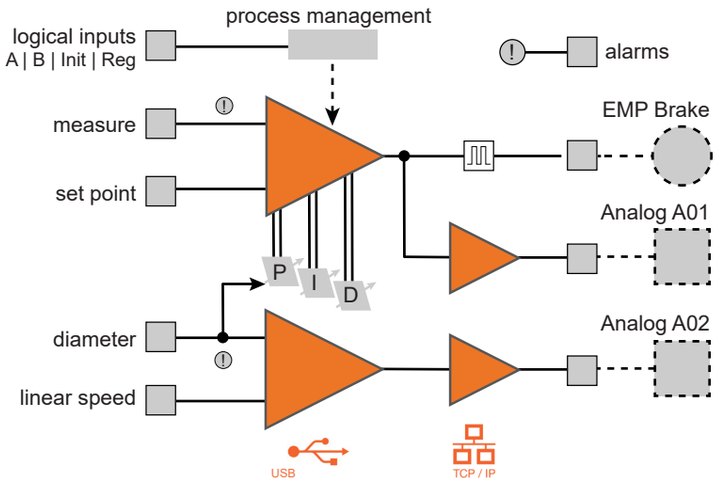
DGT300+

HMI Digital Controller

SETTINGS



PRINCIPLE



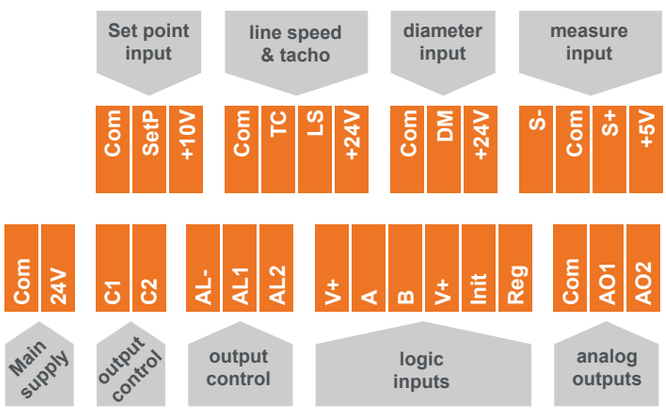
SOFTWARE

Simple interface with all parameter settings displayed in a unique window

Scope function for easy data readout

Also fully configurable by TCP/IP communication or from panel keypad & display.

CONNECTIONS



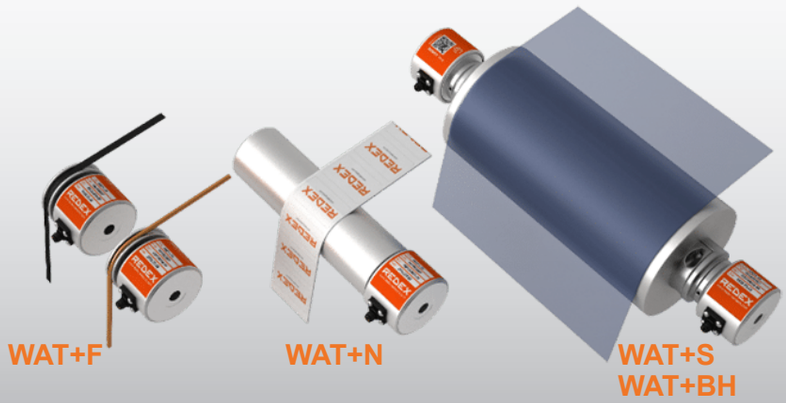
Com	0 V
SetP	Set point (0-10V or Pot.)
+5V/+10V/+24V	Internal supplies
TC	Tacho input (0-10V)
LS	Encoder input (5→24V PNP/ NPN)
DM	Diameter input
S- / S+	Signal (-) / Signal (+)
24V	24V DC - main supply
C1/C2	Power output direct supply
AL-	Output logic reference
AL1/2	Alarm outputs
V+	24V logic supply
A/B	Logic process inputs
Init/Reg	Logic regulation calculation input
AO1/AO2	Analog outputs (-10 → +10V)

> Highly modular

> Highly accurate

> Cost saving by design

Available in 2 sizes



For any type of application

Web & Wire Accurate Tension

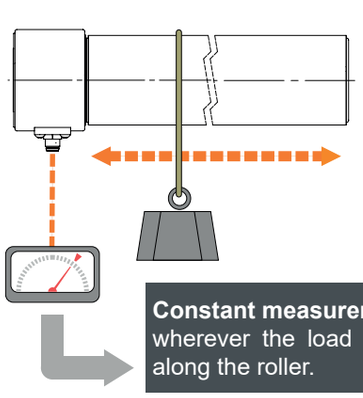
WAT+ concept enables a comprehensive range of force transducers and accessories, especially designed for dynamic tension measurement of fibers, wires and web.

WAT+ perfectly suits any technically demanding application in various high-tech industries such as, composites, wire and cable, textiles, as well as packaging, labelling & finishing equipment.

TRANSDUCERS

SIZE 1		Ref
WAT+5	Full scale 50N	ME134810-00
WAT+25	Full scale 250N	ME134802-00
WAT+50	Full scale 500N	ME134890-00
SIZE 2		Ref
WAT+100	Full scale 1000N	ME135524-00
WAT+250	Full scale 2500N	ME135525-00
WAT+500	Full scale 5000N	ME135526-00

CANTILEVER COMPENSATION



3C

Constant measurement value, wherever the load is positioned along the roller.

ACCESSORIES

ACC-F	Pulley mounting shaft	Size1
ACC-S	Live shaft mounting	Size1 & 2
ACC-BH	Dead shaft mounting	Size1
ACC-N100	Roller Ø 50 - L 100mm	Size1
ACC-N200	Roller Ø 50 & 70 - L 200mm	Size1 & 2
ACC-N300	Roller Ø 50 - L 300mm	Size1
FLANGE	Rear side mounting flange*	Size1 & 2

Tailored solution with WAT+ concept :

Create your own design!

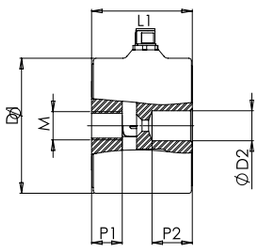
TECHNICAL FEATURES

		SIZE 1			SIZE 2		
Transducer		**WAT+5**	**WAT+25**	**WAT+50**	**WAT+100**	**WAT+250**	**WAT+500**
Reference		ME134810-00	ME134802-00	ME134890-00	ME135524-00	ME135525-00	ME135526-00
Load rating (FS)	N	50	250	500	1000	2500	5000
Safe Load limit	%FS	500			300		
Resistance	Ω	350			350		
Supply Voltage	V	5 → 10			5 → 10		
Sensivity	mV/V	~1.6			~2		
Accuracy Class	%FS	0.3			0.3		
Working Temp	°C	10 → 60			10 → 60		
Weight	g	200			460		

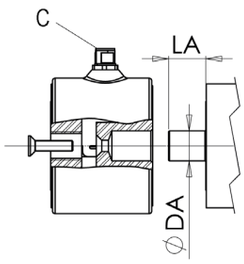
Included connector + shielded cable 5m length

DIMENSIONS I LOAD CELLS

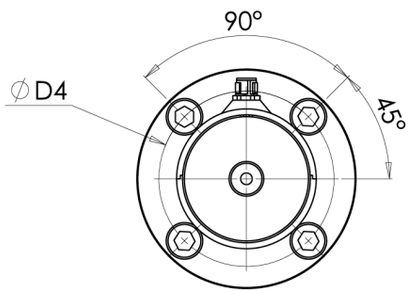
	D1	D2	L1	M	P1	P2	C	DA	LA	D3	D4	L2
SIZE 1	56	12H8	40	M10	11	17	M8	12h6	16	90	75	10
SIZE 2	76.5	17H8	57.5	M16	17.5	23	M12	17h6	21	120	96	16

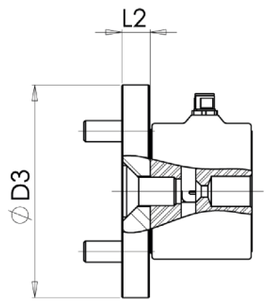


WAT+



ACCESSORY SHAFT

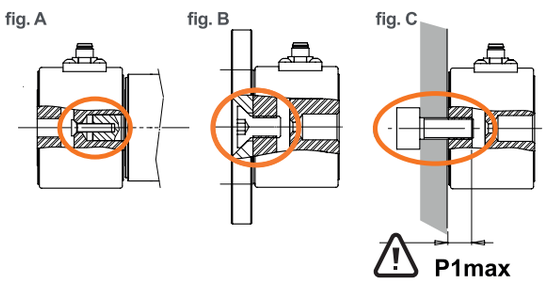




FLANGE

ASSEMBLY PRECAUTIONS FOR MOUNTING

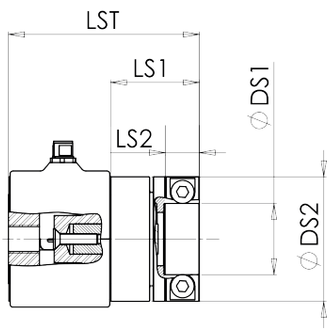
	Size	fig.A	fig.B	fig.C
Screw type (class 8,8)	Size 1	FHc M4*16	FHc M10*13	M10
	Size 2	FHc M6*25	FHc M16*30	M16
Tightening torque max value	Size 1	1.5Nm	25Nm	25Nm
	Size 2	5Nm	105Nm	105Nm



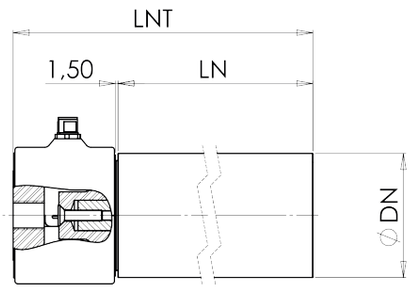
DIMENSIONS I ACCESSORIES

	DS1	DS2	LS1	LS2	LST
SIZE 1	25H8	50	42.4	13.5	82.4
SIZE 2	40H8	72	54	19	111.5

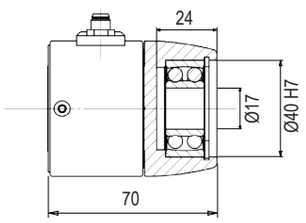
DN	LN	LNT
49.5	100 - 200 - 300	41.5 + LN
69.5	200	59 + LN



ACC-S

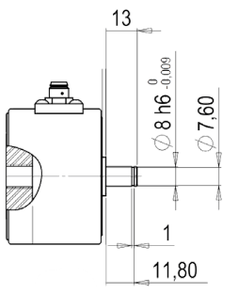


ACC-N



ACC-BH*

*Keep an axial play to ensure thermal expansion of the dead shaft.

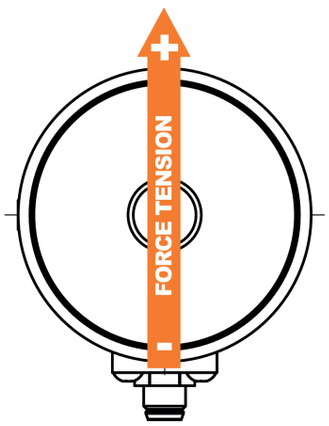


ACC-F

SIZE 1							
Accessory	FLANGE 1	ACC-S	ACC-N100	ACC-N200	ACC-N300	ACC-F	ACC-BH
Reference	ME134812-00	ME134811-00	ME134813-00	ME134808-00	ME134814-00	ME134803-00	ME134895-00

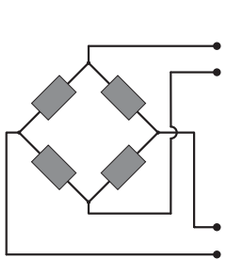
SIZE 2			
Accessory	FLANGE 2	ACC2-S	ACC2-N200
Reference	ME135837-00	ME135835-00	ME135836-00

LOAD DIRECTION



The load direction has to be oriented following the resultant direction.

WIRING

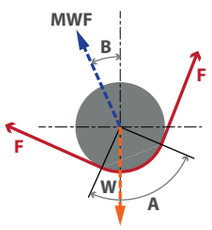


Connector
Size 1 : M8 - IEC 61076-2-104 A-Standard
Size 2 : M12 - IEC 61076-2-101 A-Standard

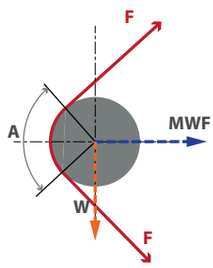
WAT+ is supplied with connector and a five meter shielded cable.

CALCULATIONS

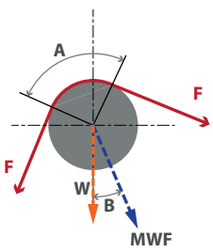
WMF = 3*.F.Sin(A/2) - W.Cos(B)



MWF = 3*.F.Sin(A/2)



MWF = 3*.F.Sin(A/2) + W.Cos(B)

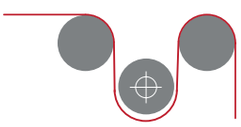


WMF = Max Working Force on load cell(s)
For 2 load cells, the MWF must be divided by 2 to size each load cell
W = Roll / pulley weight
F = Max tension (on the product)

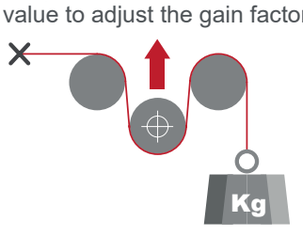
*safety factor 1.5 included

CALIBRATION PRINCIPLES

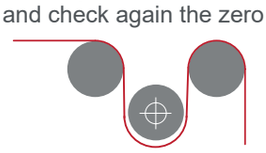
1 - Release any tension on the product and set the zero offset.



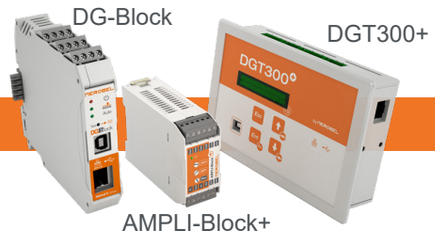
2 - Apply a known tension and set the value to adjust the gain factor.



3 - Release again any tension on the product and check again the zero value.



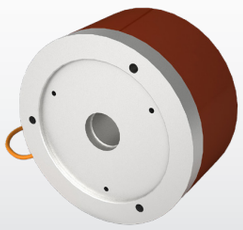
IN ASSOCIATION WITH



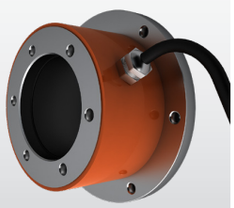
> Compact and robust design

> High torque measurement accuracy

> Easy calibration solution with shunt resistor

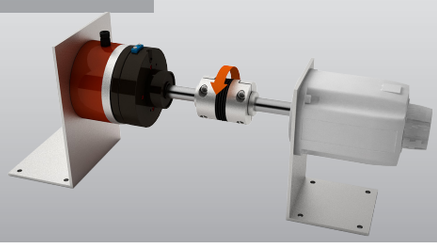


SIZE 1



SIZE 2

TRS Series offer a **plug and play solution for tests benches**, providing an accurate torque feedback allowing a more accurate & stable regulation



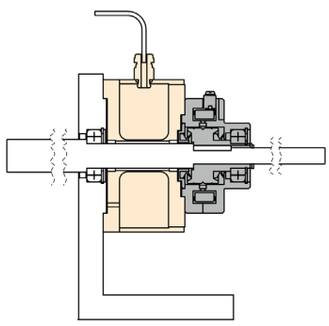
TRS Series

TRS is a robust and economical solution compared to a dynamic torque sensor.
Together with MEROBEL brakes and controller, it offers a simple and compact package solution for accurate load simulation.

- Direct mounting for FAT20 – FAT50 (size1) & FAT120 (size2)

- Mounting with flange adapters for other brake sizes

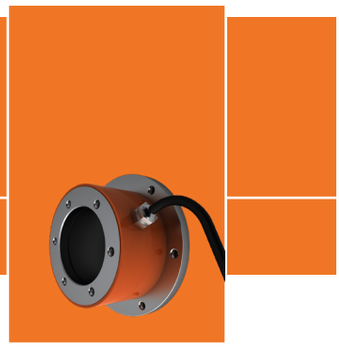
- 2m shielded cable



Size 1
Assembly principle

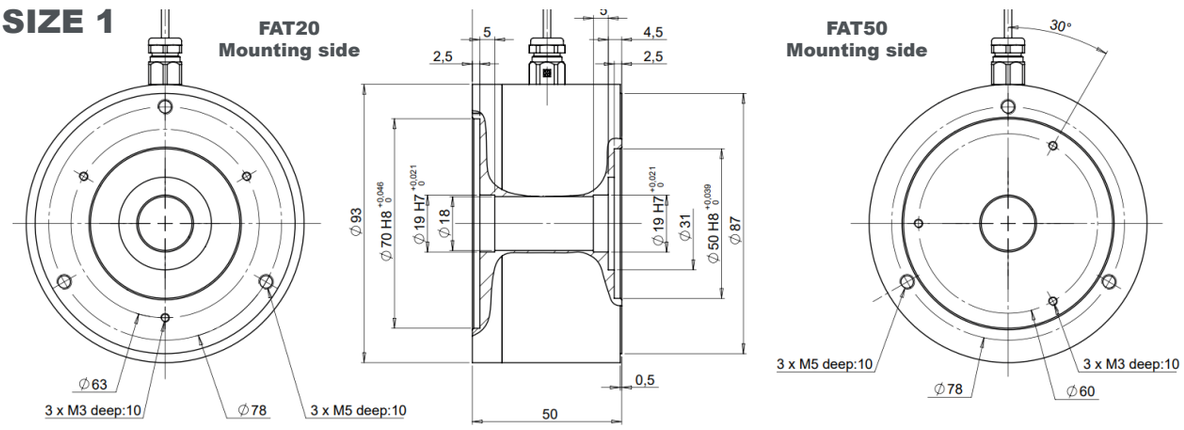
TECHNICAL FEATURES

		SIZE 1	SIZE 2		
Transducer		**TRS5**	**TRS50**	**TRS100**	**TRS200**
Part number	#	ME134554-00	ME332450-00	ME332451-00	M332452-00
Nominal Torque Range [FS]	[Nm]	5	50	100	200
Supply Voltage	[V DC]	5 → 10	5 → 10	5 → 10	5 → 10
Safe load limit	[%FS]	200	200	200	150
Accuracy	[%FS]	±0.2	±0.2	±0.2	±0.2
Sensitivity	[mV/V]	0.5	0.5	0.5	0.5
Bridge resistance	[Ω]	350	700	700	700
Temperature range	[°C]	0→ 80	0→ 80	0→ 80	0→ 80
Weight	g	410	460	460	460

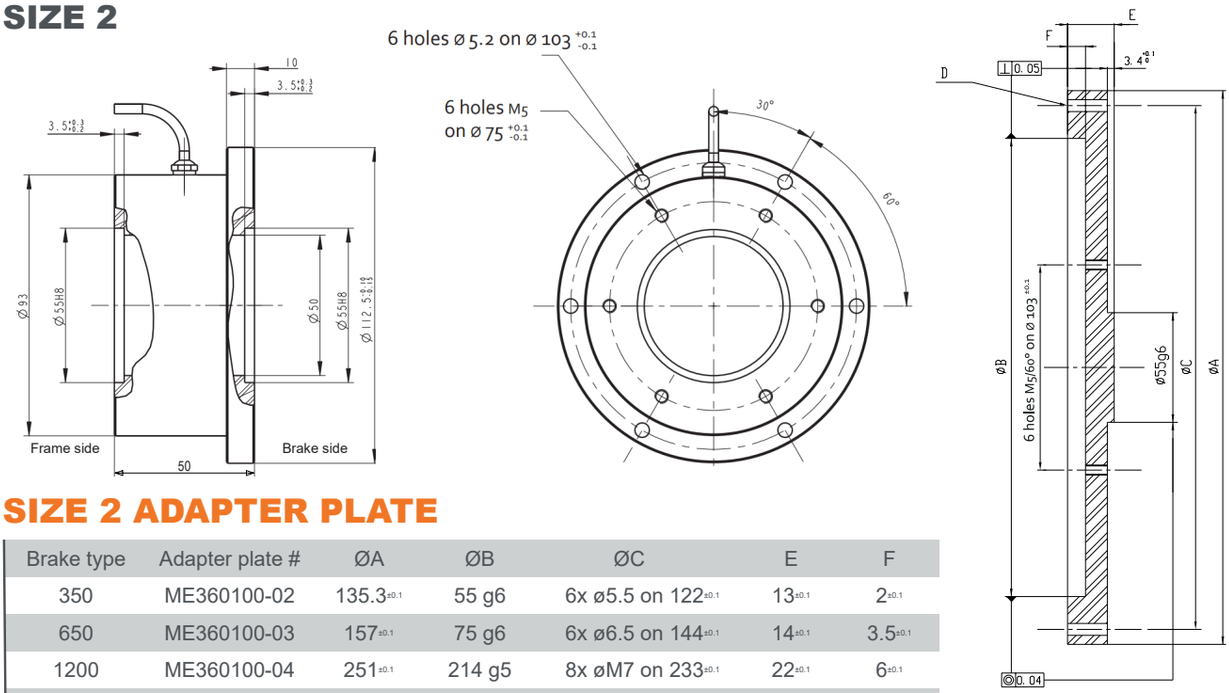


DIMENSIONS

SIZE 1



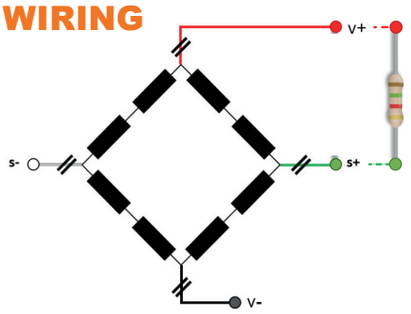
SIZE 2



SIZE 2 ADAPTER PLATE

Brake type	Adapter plate #	ØA	ØB	ØC	E	F
350	ME360100-02	135.3±0.1	55 g6	6x ø5.5 on 122±0.1	13±0.1	2±0.1
650	ME360100-03	157±0.1	75 g6	6x ø6.5 on 144±0.1	14±0.1	3.5±0.1
1200	ME360100-04	251±0.1	214 g5	8x øM7 on 233±0.1	22±0.1	6±0.1
2002	ME360100-05	278±0.1	230 g7	6x øM7 on 263±0.1	23±0.1	9.5±0.1

WIRING



R_{Shunt} *

R_{shunt}

red	V+ (5V)
black	V - (0V)
green	Signal +
white	Signal -

*** Note**

1- Shunt resistor can be used for torque calibration simulation.

2- Torque equivalent value simulated by shunt is written on the product label.

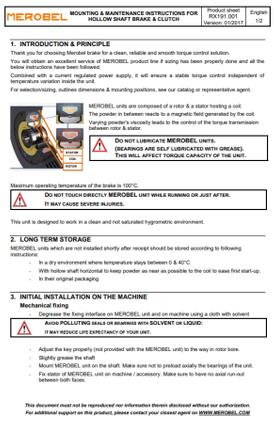
3- Ask for dedicated documentation with MEROBEL controller DGT300+ or DG-Block

MOUNTING & MAINTENANCE

MOUNTING

Installation must be made carefully to avoid damage to the bearings.
The shaft should be lubricated upon assembly, to prevent seizing.

The ball bearing assembly has been designed to support only the weight of MEROBEL's EMP devices.
Significant external forces (i.e.: radial load on the shaft) have to be supported by an additional mechanical assembly (ball bearings and / or flexible couplings).



MEROBEL | MOUNTING & MAINTENANCE INSTRUCTIONS FOR HOLLOW SHAFT BRAKE & CLUTCH | Product sheet RX191.001 Version: 01/2017 | English 1/2

1. INTRODUCTION & PRINCIPLE

Thank you for choosing Merobel brake for a clean, reliable and smooth torque control solution.
You will obtain an excellent service of MEROBEL product line if sizing has been properly done and all the below instructions have been followed.
Combined with a current regulated power supply, it will ensure a stable torque control independent of temperature variation inside the unit.
For selection/sizing, outlines dimensions & mounting positions, see our catalog or representative agent.

MEROBEL units are composed of a rotor & a stator hosting a coil. The powder in between reacts to a magnetic field generated by the coil. Varying powder's viscosity leads to the control of the torque transmission between rotor & stator.

DO NOT LUBRICATE MEROBEL UNITS. (BEARINGS ARE SELF LUBRICATED WITH GREASE). THIS WILL AFFECT TORQUE CAPACITY OF THE UNIT.

Maximum operating temperature of the brake is 100°C.

DO NOT TOUCH DIRECTLY MEROBEL UNIT WHILE RUNNING OR JUST AFTER. IT MAY CAUSE SEVERE INJURIES.

This unit is designed to work in a clean and not saturated hygrometric environment.

2. LONG TERM STORAGE

MEROBEL units which are not installed shortly after receipt should be stored according to following instructions:
- In a dry environment where temperature stays between 0 & 40°C
- With hollow shaft horizontal to keep powder as near as possible to the coil to ease first start-up.
- In their original packaging.

3. INITIAL INSTALLATION ON THE MACHINE

Mechanical fixing
- Degrease the fixing interface on MEROBEL unit and on machine using a cloth with solvent

AVOID POLLUTING SEALS OR BEARINGS WITH SOLVENT OR LIQUID: IT MAY REDUCE LIFE EXPECTANCY OF YOUR UNIT.

- Adjust the key properly (not provided with the MEROBEL unit) to the way in rotor bore.
- Slightly grease the shaft
- Mount MEROBEL unit on the shaft. Make sure not to preload axially the bearings of the unit.
- Fix stator of MEROBEL unit on machine / accessory. Make sure to have no axial run-out between both faces.

This document must not be reproduced nor information therein disclosed without our authorization.
For additional support on this product, please contact your closest agent on WWW.MEROBEL.COM

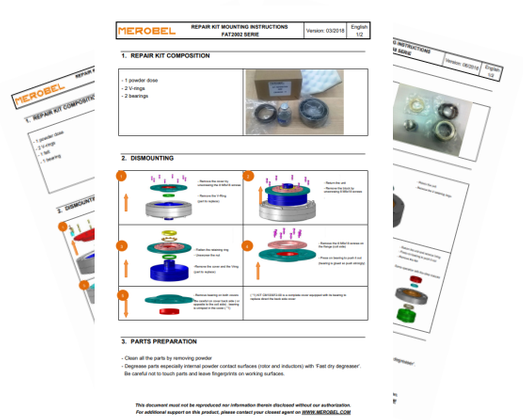
MAINTENANCE - AFTER SALES

MEROBEL offers a worldwide network of trained specialists able to refurbish the devices.

It is therefore highly recommended to return the EMP Brakes and Clutches, to MEROBEL, or one of their partners for repair.
After detailed analysis, a complete quotation is provided prior to any action.
Once the customer approves the quotation, the device is refurbished and 100% tested to guarantee that it will provide all its original performance characteristics.

If it is impossible to return the device to MEROBEL or one of its after sales partners, repair Kits are available allowing customers to facilitate a temporary repair.

To purchase the repair Kits delivered with user manuals, please consult your local supplier.



MEROBEL | REPAIR KIT MOUNTING INSTRUCTIONS FAT2002 SERIE | Version: 03/2018 | English 1/2

1. REPAIR KIT COMPOSITION

- 1 powder dose
- 2 V-rings
- 2 bearings

2. DISMOUNTING

3. PARTS PREPARATION

- Clean all the parts by removing powder
- Degrease parts especially internal powder contact surfaces (rotor and inductors) with 'Fast dry degreaser'. Be careful not to touch parts and leave fingerprints on working surfaces.

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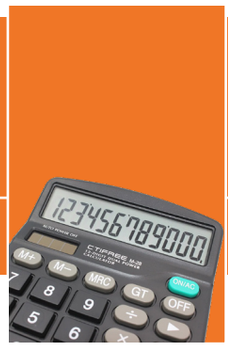


APPLICATION SHEET - WEB TENSION CONTROL

CONTACT INFORMATION

Company _____ Name _____

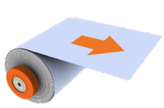
Adress _____

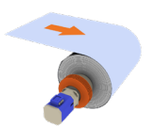
ZIP Code _____ Phone _____ Title _____

E-mail _____ Fax _____

APPLICATION

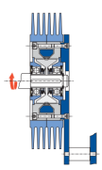
Unwind ☐ Rewind ☐ Horizontal Shaft ☐



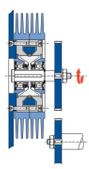


Vertical Shaft ☐

Other ☐
(please add a sketch)

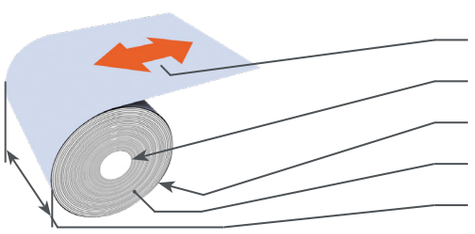


Direct Drive Shaft ☐



Parallel Shaft Mounting ☐

PROJECT DESCRIPTION



	Unit	Min	Nominal	Max
Speed				
Core Diameter				
Max Roll Diameter				
Roll Weight				
Web Width				
Tension Force				
Acceleration Time				
Deceleration Time				
Emergency Stop Time				

Operating hours/day	
Ambient temperature	
Material(s)	
Thickness	

REGULATION SYSTEM

	Manual Control	Open Loop		Closed Loop		Special
		Follower Arm	Diam. measure	Force Feedback	Dancer	Speed follower
Present	☐	☐	☐	☐	☐	☐
Future	☐	☐	☐	☐	☐	☐

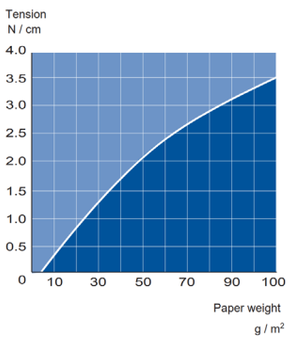
COMMERCIAL DATA

Machine type	Quantity (1st time)
Schedule	Quantity / year

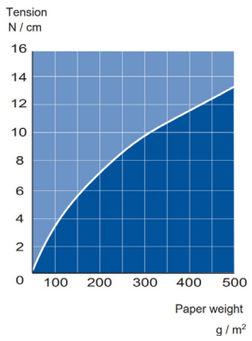
TENSION CHARTS

PAPER

g/m²	N/cm	*PLI*
10	0.33	0.19
20	0.79	0.45
30	1.25	0.71
40	1.65	0.94
50	2.05	1.17
60	2.38	1.36
70	2.64	1.51
80	2.98	1.70
90	3.23	1.84
100	3.47	1.98

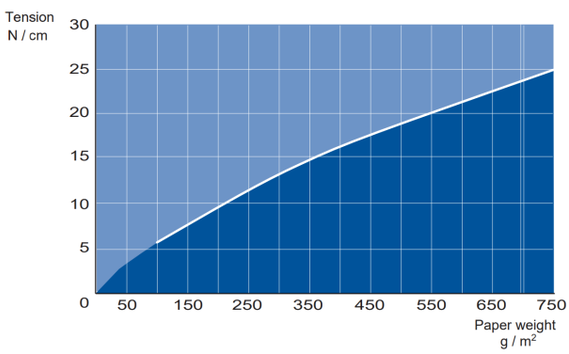


g/m²	N/cm	*PLI*
100	3.47	1.98
200	6.52	3.72
300	9.44	5.39
400	11.6	6.62
500	13.6	7.76



CORRUGATED

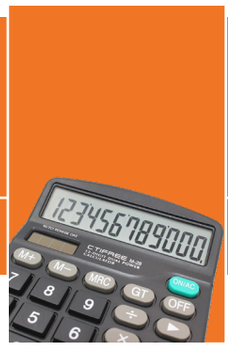
g/m²	N/cm	*PLI*	g/m²	N/cm	*PLI*
100	2.3	3.0	450	17.6	10.0
150	7.0	4.0	500	19.0	10.8
200	8.8	5.0	550	20.2	11.5
250	11.1	6.3	600	21.5	12.3
300	12.9	7.4	650	22.6	12.9
350	15.0	8.6	700	23.6	13.5
400	16.1	9.2	750	25.0	14.3



OTHER MATERIALS

Type of material	N / µm / cm	lbs / in or web width
Acetate	0.035	0.5 /mil
Aluminium	0.035 - 0.105	0.5 - 1.45 /mil
Cellophane	0.042	0.6 /mil
Nylon	0.015 - 0.02	0.2 - 0.3 /mil
Mylar	0.035 - 0.07	0.5 - 1.0 /mil
Polyethylene	0.01 - 0.02	0.15 - 0.3 /mil
Polypropylene	0.015 - 0.025	0.20 - 0.35 /mil
Polystyrene	0.06 - 0.08	0.85 - 1.15 /mil
Vinyl	0.0035 - 0.014	0.05 - 0.2 /mil

For laminated, coated product, add 0.2 N/cm



APPLICATION SHEET - WIRE & CABLE TENSION CONTROL

CONTACT INFORMATION

Company _____ Name _____

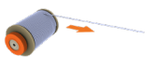
Adress _____

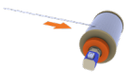
ZIP Code _____ Phone _____ Title _____

E-mail _____ Fax _____

APPLICATION

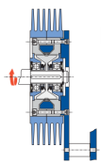
Unwind ☐ Rewind ☐ Horizontal Shaft ☐



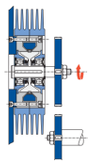


Vertical Shaft ☐

Other ☐
(please add a sketch)

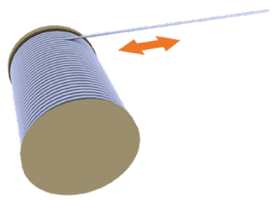


Direct Drive Shaft ☐



Parallel Shaft Mounting ☐

PROJECT DESCRIPTION



	Unit	Min	Nominal	Max
Speed (continuous)*				
Core Diameter				
Max Roll Diameter				
Roll Weight				
Web Width				
Tension Force				
Acceleration Time				
Deceleration Time				
Emergency Stop Time				

Operating hours/day
Ambient temperature
Material(s)
Breaking

REGULATION SYSTEM

	Manual Control	Open Loop		Closed Loop		Special
		Follower Arm	Diam. measure	Force Feedback	Dancer	Speed follower
Present	☐	☐	☐	☐	☐	☐
Future	☐	☐	☐	☐	☐	☐

COMMERCIAL DATA

Machine type	Quantity (1st time)
Schedule	Quantity / year

APPLICATION SHEET - TEST BENCHES & TORQUE CONTROL

CONTACT INFORMATION

Company _____ Name _____

Adress _____

ZIP Code _____ Phone _____ Title _____

E-mail _____ Fax _____

APPLICATION

Brake ☐ Clutch ☐ Torque Limiter ☐ Horizontal Shaft ☐

Vertical Shaft ☐

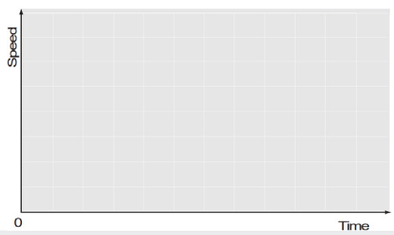
Other (please add a sketch) ☐

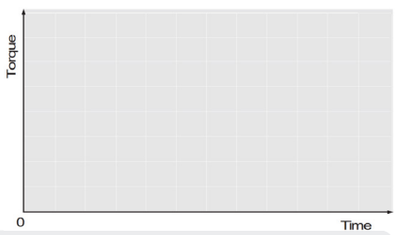
PROJECT DESCRIPTION

	Unit	Min	Nominal	Max
Torque				
Rotation Speed				
Acceleration				
Deceleration				
E-Stop				
Ambient temperature				

Intermittent duty cycle?

Please complete the graphs



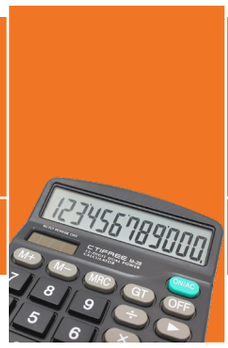


REGULATION SYSTEM

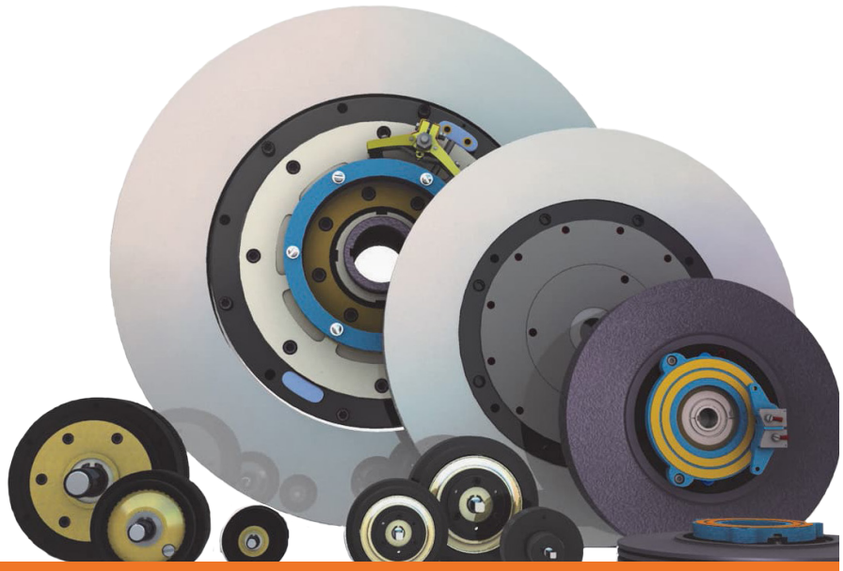
	Manual Control	Force or Torque Feedback
Present	☐	☐
Future	☐	☐

COMMERCIAL DATA

Machine type	Quantity (1st time)
Schedule	Quantity / year



NOTES



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Torque & Tension