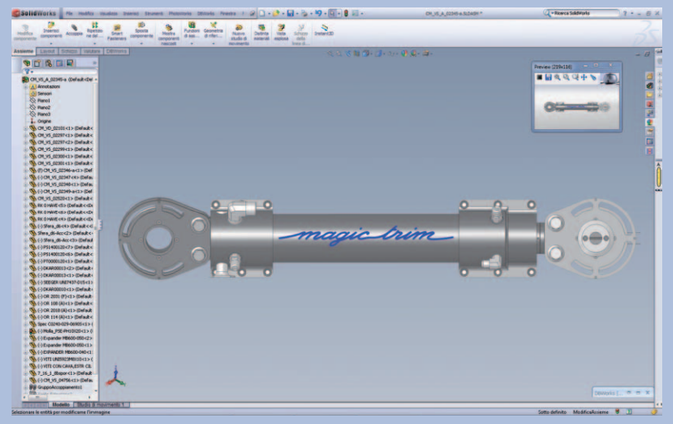
magic trim



Magic trim was created in 1998. It has been the first hydraulic double acting cylinder with integrated 4:1 tackle designed to work with two different speeds.
It is the result of a pure Giovanni Cariboni's innovative idea; the product is **patented** from Cariboni.
Nowadays, the Magic Trim appears on more then a hundred sailing boats all over the world, pushed by the need to trim and release in a very short time the sheets under big loads. Magic Trim spreads from a lenght of 30' to an unspecified lenght: the biggest size produced today is the 210' of the Magic Titanium.

The idea

This is a simple and clever idea: a 4:1 tackle made by a double acting hydraulic cylinder with two sheaves mounted at both ends. When the actuator is extended, the sheet passing through the sheaves is trimmed by a length equal to four times its extention; on the contrary, when the actuator is shortened the sheet is released.
With this revolutionary system, to trim the sails you can eliminate the need of whinches on deck; the result is a clear deck with a powerful and fine system to control the sails.

The main features

Magic Trim has a 4:1 tackle but the load transmitted to the fixing points of the ram is identical to the sheet working load thanks to the system design, which permits you to have a lighter boat structure.
Considering the same sheet load, Magic Trim is faster, lighter and more reliable than the traditional maneuvering systems; therefore it is successfully utilized by cruising and regatta sailing boats. With Cariboni's hydraulic system, it is possible to have fast and slow regulations even with heavy loads just pushing a button!
For fine tuning, Magic Trim is available with full integrated linear sensors and proportional control of speed.
Magic Trim works with a designed working load and when the regulation is done, it can go up to 1.6 times the maximum designed working load; when higher values are applied, the sheet is automatically released, in order to preserve the boat equipment.

The main applications

Besides having a number of special applications, Magic Trim is normally used on sailing boats for the main sheet regulations, main sail traveler or jib sheet regulations, and in every other occasion it is necessary to pull long sheets in a limited space (for lifting keel cylinder too).

A flash and clear deck on "Sizzler" the astonishing 60' day sailer designed by Tony Castro.
Magic Trim are used for jib and mainsheet controls tacking off the winches and any jam with the sheet!

A Magic story...

1998 - Magic Trim
The original one, patented since 1998.
Cariboni improves hydraulic rams for sail trimming by developing the Magic Trim, faster then the conventional rams and with the peculiarity of having two speeds: this allows to have a faster and smoother control of the sails with the best reliability.

2000 - Magic Simple
Designed for 2000 AC yachts, Magic Simple is the powerful solution to trim the highest load you can find on a race sailing yacht. Magic Trim Simple has a 2:1 tackle powered by a push cylinder in a compact and lightweight solution.

2001 - Magic Testa
It is a special version of Magic Trim, engineered for unique applications: those units have been installed on the 60' trimarans Tim an Bonduelle in which the mainsheet and the canting mast are hydraulically controlled by Magic Testa cylinder.

2002 - Magic Trim Double
Magic Trim Double is the straight development of Magic Trim and Magic Simple concept: a fast Magic Trim and the powerful Magic Simple all in one. So you can have a smart system which copy the load on sheet and let you save space, weight and power.

2004 - Magic Air
This special kind of Magic Trim has the same 4:1 tackle powered by the hydraulic push cylinder, but the ease of the sheet is driven by the air spring on the head ram. Thanks to Magic Air we're able to offer the same features of the standard Magic Trim with a lighter and more compact system.

2005 - Magic Trim + Magic Double arrangement
A Magic Trim ram to control faster the sheet and a Magic Double for a quick trimming. This kind of arrangement has often custom sheaves solution full integrated on the two Magic, according to the yacht design.

2007 - Smart Magic Trim
This is the Magic Trim for high-tech sailing yachts! What you can see from outside is just the slim shape of Magic Trim; but inside there are all the technologies of a magnetic field linear sensor ready to control time after time the cylinder status. This is the standard solution for a full automatic sail trimming system.

1998 - Magic Trim

2008 - Smart Magic Double
Smart Magic Double matches together everything that you can ask from a hydraulic trim system; sharp control of the sheet with two integrated linear sensors; speed and power thanks to the Magic Double concept; safety and quickly control of the rams with the incorporated max pressure and directional control valves. The ultimate solution for the next century sailing yachts.


Wally 148' Saudade

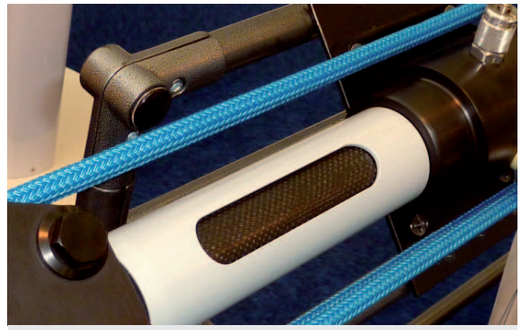
2009 - Magic Boom
Take a Cariboni's Magic Trim, squeeze it on a modern sailing yacht boom and what you have is a Magic Boom! This kind of Magic Trim has special features in order to easily place the cylinder inside the sailing yacht booms.

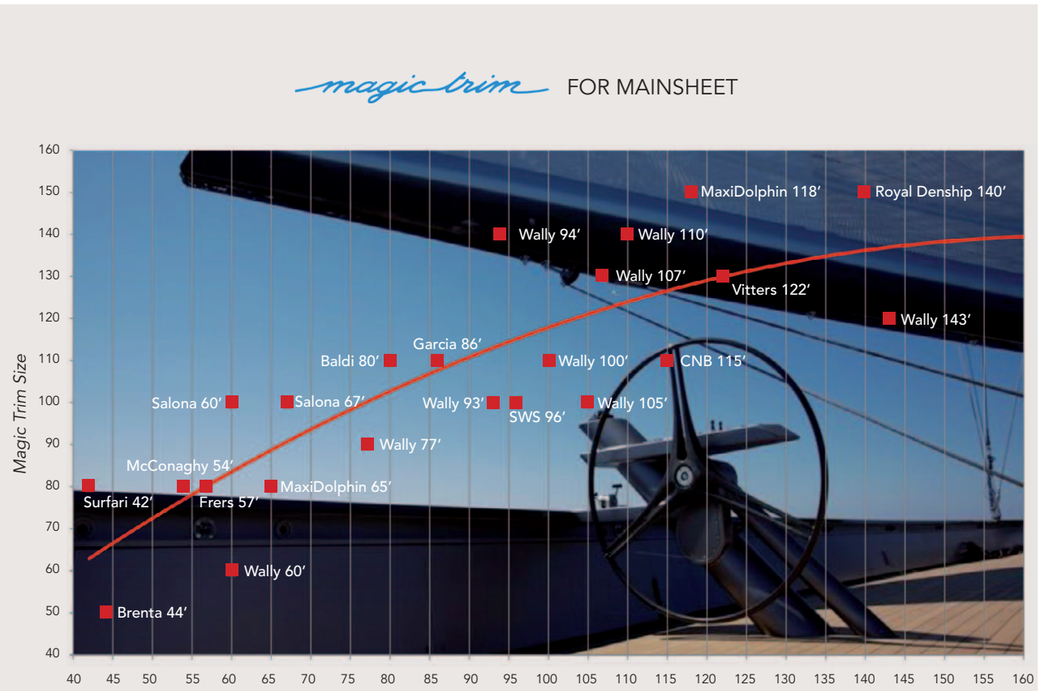
A magic story...

2010 – Carbon Magic
Magic Trim with special carbon fibre rod is available for racing yachts to cut down weight and boost up the power of our hydraulic system. Carbon Magic works at higher pressure than standard rams and it weight almost half then the other standard systems with the same working load.
Less weight, more power, more efficiency.

Special Magic
Every Magic Trim is special but, how do you call a Magic Trim with titanium rod? Or another one with 17-4 PH rod, titanium tube and high strength aluminum alloy parts? Theese Magic trim cylinders are just an hallmark of Cariboni's attitude for their customs needs. More power? Less weight? Something special? Just ask!

...which goes on!


2010 – Carbon Magic



HOW TO CHOOSE YOUR MAGIC TRIM FOR MAINSHEET

The buckling length is one of the Magic Trim size selection. Here is a simple procedure to calculate the effective mainsheet stroke and therefore the minimum Magic Trim stroke required.
You need to know only two things:
- the effective main sheet stroke
- the maximum load on mainsheet

Follow this easy example to calculate your mainsheet stroke:
d = distance between sheet and mast
b = distance between boom and deck
α = back spread angle
β = effective maximum mainsail angle (ex: α -10° to avoid any contact between mainsail and cross-trees)

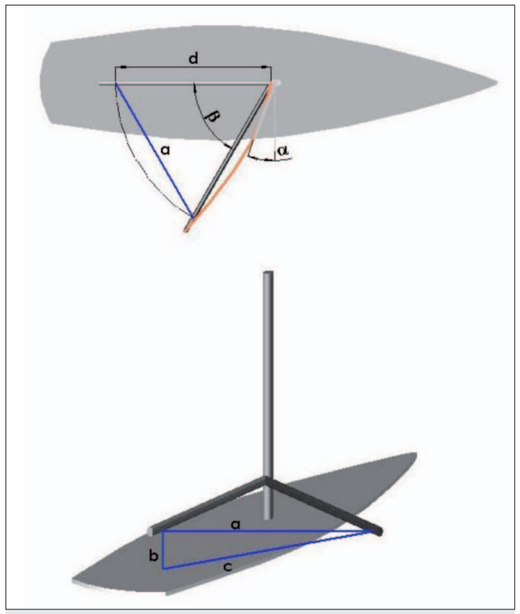
You have to calculate first of all the "**a**" length:

$$\alpha = 2\ x\ d\ x \sin\left(\frac{\beta}{2}\right)$$

the "**c**" dimension:

$$\alpha = \sqrt{a^2 + b^2}$$

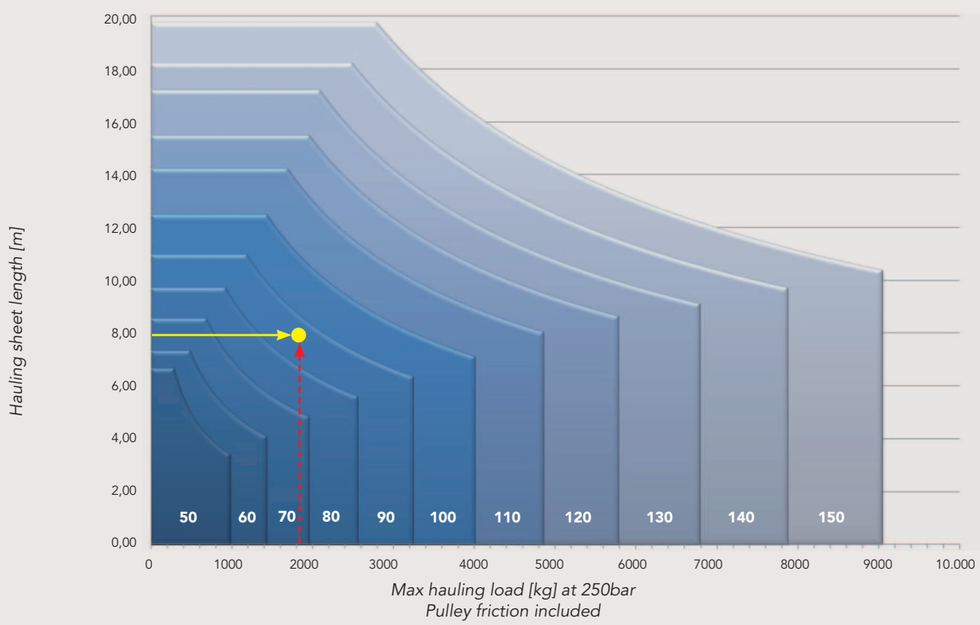
And the effective sheet stroke
s = **c – b**
Suppose to have **d**=10m, **b**=2.5m and β =60° you calculate:
a = **d** = 10m
c = 10.3m
s = 7.8 m



Mainsheet lenght

Now put this sheet length and the maximum load on sheet into this diagram and found out which is the size your Magic Trim for mainsheet.

Example: effective mainsheet stroke s = 7.8 meters, load on sheet of 1800kg -> Your Magic Trim is: **MT_90_1850** (90mm of bore, 7.8/4=1950mm of stroke)



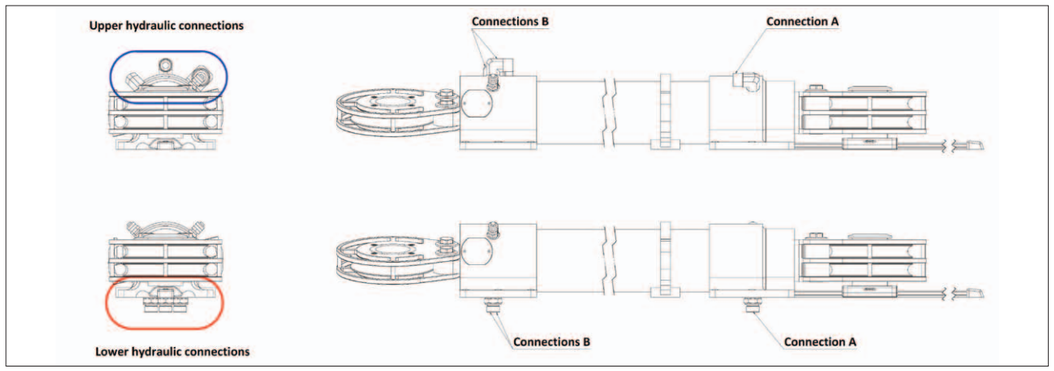
TECHNICAL SPECIFICATIONS

You can calculate the overall length of your Magic Trim, the dryweight and the working pressure of the cylinder filling the form below (in blue an example).

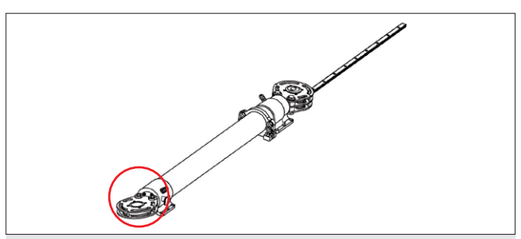
MODEL	Hauling Sheet Lenght	Stroke	Magic Max Length		Magic Weight			Working Pressure		
		Y	Const. Length	Lmax	Const. Weight	Weight Coeffi-cient	Weight	Hauling Load	Pressure Coeffi-cient	Pressure
	S (mm)	*Y = S/4 (mm)*	*T*	*L_{MAX} = S/2 + T (mm)*	*Q*	*U*	*W = Q + U * S/4 (kg)*	*F (kg)*	*C*	*P = F * C (bar)*
MAGIC 50			529		6,7	0,0072			0,1996	
MAGIC 60			532		8,2	0,0080			0,1388	
MAGIC 70			595		10,2	0,0115			0,1020	
MAGIC 80	7800 mm	1950	644	4554 mm	16,0	0,0119	39,25 kg	1800	0,0781	141 bar
MAGIC 90			766		24,6	0,0205			0,0617	
MAGIC 100			797		28,7	0,0235			0,0500	
MAGIC 110			800		30,7	0,0286			0,0413	
MAGIC 120			801		35,2	0,0331			0,0347	
MAGIC 130			884		46,5	0,0407			0,0296	
MAGIC 140			976		53,5	0,0441			0,0255	
MAGIC 150			1014		66,6	0,0492			0,0222	

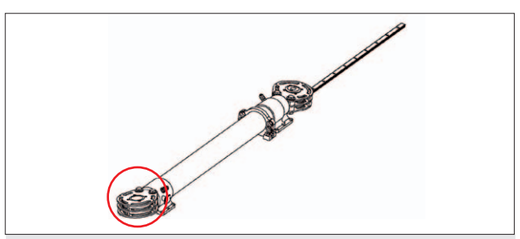
On our websiste there is also a very simple program to choose your model and to have these basic data about you Magic Trim.

MagicTrim has two hydraulic connections ("A" and "B"): for better installation layout you can choose the place of your hydraulic connections in the upper side of the cylinder or in the lower side.

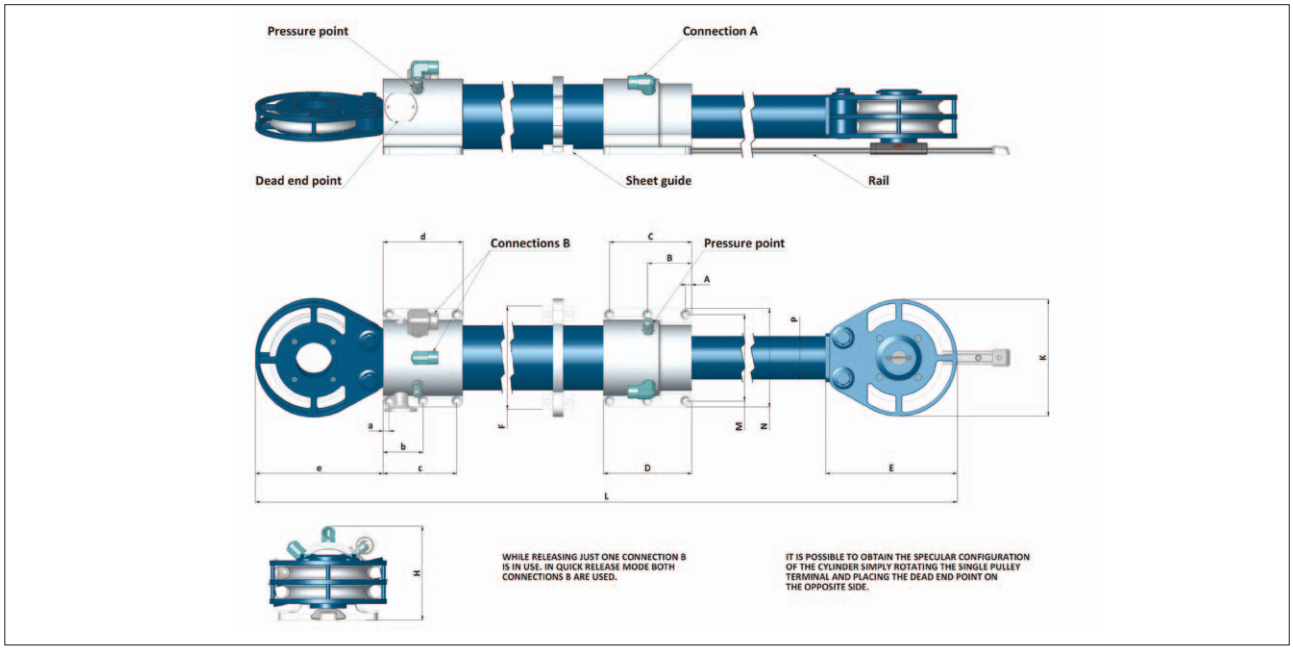


The Magic Trim is available also with double fixed pulley. You need the double pulley option when you have a furling system and you need to change the length of the sheet to permit the sail to be furled.


Single fixed pulley


Double fixed pulley

TECHNICAL SPECIFICATIONS



MODEL	A	B	C	D	E	a	b	c	d	e
	(mm)	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*
MAGIC 50	10,00	69,50	129,00	139,00	168,50	10,00	105,00	-	115,00	163,50
MAGIC 60	10,00	106,00	-	116,00	165,00	10,00	106,00	-	116,00	162,00
MAGIC 70	10,00	75,00	140,00	150,00	184,75	10,00	60,00	110,00	120,00	176,94
MAGIC 80	10,00	80,00	-	90,00	203,50	10,00	60,00	110,00	120,00	194,50
MAGIC 90	12,00	55,50	99,00	111,00	257,50	12,00	74,00	136,00	148,00	253,50
MAGIC 100	12,00	87,25	162,50	174,50	260,50	12,00	79,00	146,00	158,00	252,50
MAGIC 110	12,00	59,55	107,10	119,10	266,58	12,00	85,00	158,00	170,00	258,58
MAGIC 120	15,00	87,50	160,00	175,00	285,00	15,00	83,25	151,50	166,50	278,00
MAGIC 130	19,50	97,50	175,50	193,50	298,25	15,00	89,00	163,00	178,00	291,25
MAGIC 140	15,00	102,75	190,50	205,50	327,00	15,00	91,25	167,50	182,50	320,00

MODEL	F	H	K	M	N	P	Bolts Ø	Max sheet Ø	CONN. A	CONN. B
	(mm)	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*	*(mm)*		
MAGIC 50	135,00	110,00	149,00	105,00	125,00	42	8	14	9/16" UNF - JIC 37°	9/16" UNF - JIC 37°
MAGIC 60	151,00	114,00	147,00	110,00	130,00	50	8	14	9/16" UNF - JIC 37°	9/16" UNF - JIC 37°
MAGIC 70	164,50	123,20	155,00	130,00	150,00	60	8	16	3/4" UNF - JIC 37°	3/4" UNF - JIC 37°
MAGIC 80	174,50	131,75	180,00	140,00	160,00	70	8	18	3/4" UNF - JIC 37°	3/4" UNF - JIC 37°
MAGIC 90	225,00	157,50	235,00	165,00	188,00	75	10	20	3/4" UNF - JIC 37°	3/4" UNF - JIC 37°
MAGIC 100	233,00	173,00	231,00	171,00	195,00	85	10	20	3/4" BSP	3/4" BSP
MAGIC 110	231,00	181,57	239,00	182,00	206,00	95	10	22	3/4" BSP	3/4" BSP
MAGIC 120	248,00	193,45	262,00	205,00	235,00	100	12	22	3/4" BSP	3/4" BSP
MAGIC 130	280,00	208,18	274,00	218,00	248,00	110	12	24	3/4" BSP	3/4" BSP
MAGIC 140	290,00	215,00	290,00	220,00	250,00	120	12	24	3/4" BSP	3/4" BSP