Data Sheet:	MTX_H - Straw Bale Breaker

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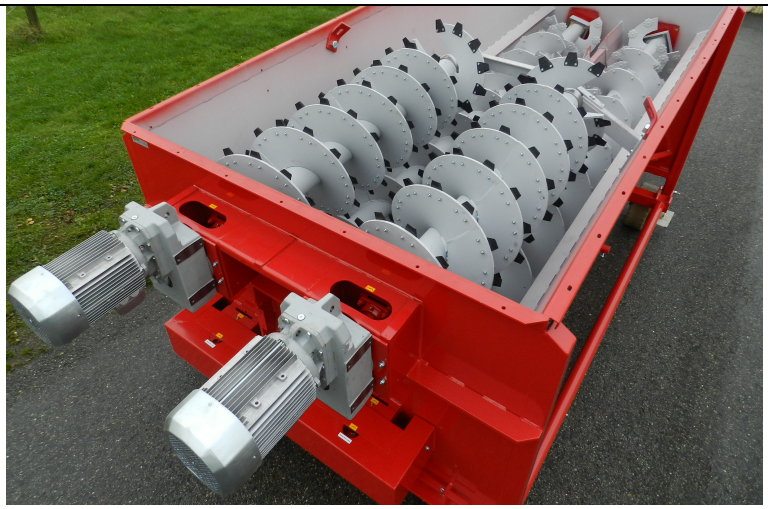
Pictures	 Front outlet on the machine, convayer in background
	 Rear inlet into the machine
	 Bale breaker auger inside the machine, without flexible shear bar.

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Machine number	1071-003H (18 m^3), 1071-005H (22 m^3), 1071-006H (30 m^3), 1073-002H (42 m^3), 1073-001H (50 m^3)
Custom tariff number	84369900
Machine paint	Standard ISO 12944-5 category C2. Machines, guards etc. comes in a color type RAL 3001 red suitable for indoor, non corrosive environment - water and oil resistant -15 to + 60 degrees C, surface purified with alkaline degreaser, painted with a machine primer and here after coating paint.
Standard	DS/EN 60204-1:2006 Safety of Machinery - Electrical Equipment of Machines, DS/EN ISO 13850 of January 29th 2007 emergency stop, DS/EN ISO 13849-1 safety-related parts of control systems, DS/EN 60204-1: 2006, cable installation method E
Machine function	The Cormall straw bale breaker is based on our traditional diet feed mixer. The material is filled into the rear of the machine where two bale breaker augers with flexible shear bars destroy bale stamps or round bale structure and fills the material into the two main augers that transport the material to the top. At the top is the material either taken out or reversed to the back of the machine by the molehill in the top. With straw is the machine working as a bale breaker that mixes the straw, breaks up round bales or the stamps of the big bales, and distributes the straw to a hammer mill with a controlled speed by using a auger with frequency control as discharge device thus ensuring regulation of the discharge speed accordingly to the load of material transported to the hammer mill. The machine is placed on load cells with a weight control to ensure the constant refill of material and keeping a certain amount of straw in the machine at all time.
Blockage and overload control:	- Bale breaker augers: They are turning the material against the flexible shear bar. Material can be contaminated or blocking and course blocking of the auger. To overcome this are the two augers reversed. The frequency inverter on each motor measures the amp usage and makes the automatic reverse when the augers are overloaded. - Main augers in the MTX_H: must have the same reversing, can be without frequency inverter. - 2x Ø 400 discharge augers: must have the same reversing control. Must be with frequency inverter. Value settings: overload above 80% of A_{max} for more than 0,7 sec. = stop, rev. 2 sec. WARNING! NEVER MORE THAN 2 SEC. REVERSE.

Function of the weight control and refill.	The components standard delivered and used for this is: 1. 4 load cells 2. Junction box for connecting the load cells 3. Weight computer 1) Standard: C-100 in straw mode version a) Relay switchboard b) Power supply c) Large display 2) Analogue: Digistar a) Adapter for junction box 4. On/off switch, filling the MTX_H (is used during) Notice that 3.1 and 3.2 are two different ways of doing it: With C-100 (3.1): All parts must be connected accordingly to the manual for the weight computer. The working mode of the C-100 (3) must be set to nr 1. “Loading mode”, the figures for max load and refill load must be set in the “extra function” of the C-100 this will overwrite the normal function for the mode. The on/off switch (pos 4) for the feeding system that fills material into the MTX_H (BT 170 table or any other device), must be connected to terminal nr. 10 inside the relay switchboard (4) With Digistar analogue signal (3.2): This solution requires programming in the PLC panel board and with a analogue reading into the PLC. The programmer has to convert the analogue signal into weight or percent, and there has to be Tara function for setting 0 straw in the machine. Correct connection and programming will ensure that the table stops when the max level is reached, say 900 kg, and start again when the load comes under min. level, say 850 kg. <u>C-100/Analogue - First filling and service filling:</u> The on/off switch (4) is used for manually on/off of the signal from weight signal or to overwrite this when calling for material. The two augers need time to take the material away from the filling end until working level is reached.

Function of the discharge system	The components standard delivered and used for this is: 1. Discharge Shutter, standard for MTX 2. Hydraulic pump and valves, standard for MTX 3. 1-0-2 switch for open/close signal, manually. 4. Contra valves and nozzles for holding cylinder position 5. Ø 2x 400 discharge auger with frequency control 6. Rod sensor for measuring opening level of the shutter Notice that this can be done in two ways, with or without rod/string sensor (6.) <u>Method 1- Manual overwrite 1-0-2 switch:</u> The standard shutter can be operated manually with the switch (3). The opening of the shutter can be seen from the meter arm on the side of the shutter. <u>Method 2 - Automatic adjustment of shutter opening:</u> The rod sensor pos 6, is used to have exact knowledge of the shutter position and is used when there is: 1. FULL STOP; of discharge auger, due to production stop or overload on the hammer mill. a. REACTION - close the shutter to avoid over-fill/stuffing into the discharge auger. 2. HIGH; Constant high speed on the discharge auger due to high call from hammer mill, this happens when you have dry straw, crisp straw or you have changed to large milling screen. a. REACTION – Open the shutter to a larger opening, either as a presetting or regulation. 3. LOW; Constant low speed on the discharge auger due to low call from hammer mill, this happens when you have wheat straw, strong straw or you have changed to small milling screen. a. REACTION – close the shutter to a smaller opening either as a presetting or regulation. WARNING: There has to be a tolerance with regard to reaction on signal from rod/string sensor, the hydraulic pump is not designed for frequent on/off! <u>Philosophy for reaction 2 High:</u> If the auger is running full speed, that means you are not getting as much material out as the hammer mill can produce, so by opening higher you get higher capacity. <u>Philosophy for reaction 3 Low:</u> Slow working auger can course stuffing into the auger from the mixer, and this can create bad filling of the hammer mill, with too large concentrations from the auger flight. <u>Discharge auger - load control on hammer mill:</u> Pos 5 is used to control loading to the hammer mill when it is overloaded and to ensure smooth filling to the hammer mill, by regulating the speed by use of a PID algorithm and working it around a set point on the Amp usage of the hammer mill.

RISK ASSESMENT Machine	The machine can be used as a "stand alone" machine and is therefore also delivered with a CE marking and conformity declaration.

RISK ASSESMENT – ATEX

BGIA	GESTIS-STAUB-EX	
Material	Stroh (2213)	Miscanthus
Feuchte	-	10,2 %
Korngrösse < 500 µm	96%	56%
Korngrösse < 125 µm	26%	35%
Median-Wert µm	200 µm	280 µm
UNtere Ex-Grenze	125 g/m^3	60 g/m^3
Max Ex Überdruck	8,0 bar	7,7 bar
K_{ST}-Wert [bar m/s]	47	115
Ex-Fähigkeit	St1	St1
Zündtemp.	470 C	-
Glimmtemperatur	310 C	-

Wheat straw:
We have primary evaluated the risk for dust explosion based on the conditions that have to be full filed with regard to dust explosion, and have used the official figures from the German institute BGIA: As translation to the above table sheet is the most important figures as follows:

- Fragmentation must contain 96 % below 0,5 mm.
- The medium length must be 0,2 mm

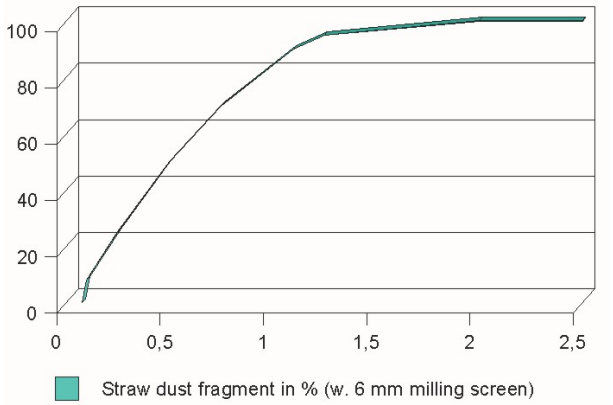
The fragmentation of any straw quoted from 5 mm screen and more:

- 96 % will be more than 1,3 mm

We conclude that no person is in danger of explosive burning, only normal fire is possible.

Screening sample showing safety margin with regard to ATEX standard and BGIA (DONG/E2 2002)

This sample was provoked with long time vibration, where many longer straws where going through the screen on the long side.



EN/ISO 13849-1

Safety levels:
PLr: a, as machine with manual start
PLr: c, as machine with automatic start if access is possible and not restricted.

Analyzed risk following EN-ISO 13849-1:	S	F	P	PLr
1. Mounting: The machine is provided lifting positions that ensures balance when lifting and strong enough to hold machine load. Follow instruction from the manual, when mounting the machine. Work place assessment should be made, before start with mounting.	S2	F1	P1	c
2. Operating: a. In automatic: The machine has to be mounted with a filling device, that provides cover for accidental entering into the machine like Cormall BT 170 straw bale table or similar, and with a closed connected outtake cormall twin auger or similar.	S2	F1	P1	c
b. In manual with front loader: The machine must be specific ordered for this and placed on same floor level as the loader is driving at, to prevent accidental entering of the machine.	S2	F1	P1	C
3. Servicing: a. All lubrication positions are from a safe position.	S1	F1	P1	A
4. Renovation: a. Change of knifes inside the machine can happen 3-4 times a year. To change knifes one has to go into the machine. Access into the machine is provided through filling hole from filling device, cormall BT 170 bale table or similar. Before entering the machine must be turned off on the main switch and locked. The filling device must also be turned off. Before entering from filling device, place/drop down over the two bale breaker augers a wood plate, to prevent from stepping down onto the knifes. Work place assessment should be made.	S2	F2	P1	D
b. Oil change on the main planetary gears must be made from a build up platform suitable for the job. Work place assessment should be made	S1	F1	P1	A
5. Scrapping/recycling: same comment as under 1. Mounting	S2	F1	P1	C

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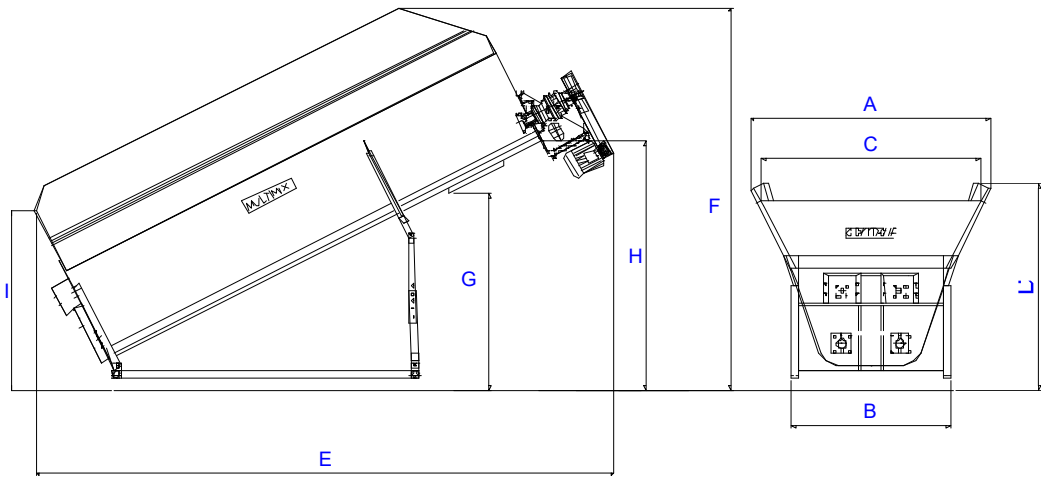

Dimensions:

Mixes	18 m³	22 m³	30 m³	42 m³	50 m³
A	2900	2900	3100	3800	3800
B#	2400	2400	2600	3190	3190
C	2450	2450	2640	3380	3380
D	2550	2550	3040	3290	3290
E	6000	6900	7800	8000	8500
F	4550	5100	5650	5990	6200
G	2050	2300	3030	3030	3500
H	2550	3000	3640	3640	4150
I	2050	2050	2150	2150	2150
weight kg	6800	7900	8900	11200	14100
plate mm	10	10	10	10	10
Shutter mm.	400	900	900	900	900
Auger size					
15mm, Ø	600	600	600	800	800
rpm/min (280/160)	25	25	25	25	25
Motor					
kW 2x	7,5	11	15	18,5	22
RPM min^{-1}	1400	1400	1400	1400	1400
Starter	Y/D	Y/D	Y/D	Y/D	Y/D
Wire mm²	7x2,5	7x2,5	7x2,5	7x4	7x4
kW pump	0,75	0,75	0,75	0,75	0,75
Starter	DOL	DOL	DOL	DOL	DOL
Wire mm²	4x1	4x1	4x1	4x1	4x1
kW Valve 2x	0,1	0,1	0,1	0,1	0,1
Starter	DOL	DOL	DOL	DOL	DOL
Wire	4x0,75	4x0,75	4x0,75	4x0,75	4x0,75
Bale braker	2x7,5 fq.	2x7,5 fq.	2x7,5 fq.	2x7,5 fq.	2x7,5 fq.

#) incl. Weight

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machine	Spare parts	Item number	Normal wear	Accidental	Warranty part	Cormall/ Supplier stock	Lead time	Units
MTX_H	Pressure bearing	3068.204			x	+	D	1
	Bridge breaker	3071.299		x		-	D + 2 days	1
	Shaft for bridge breaker	3068.275			x	+	D	1
	Knives	3599.014	x			+	D	150
	Auger	3071.575			x	-	D + 5 days	2
	Planetary gear	3503.018			x	(+)	Dd	1
	V-belt	3524.091		x		+	D	5

Critical materials.

1 - No problem, 2 - Some difficulties, 3 - Do not use

Material	Ordinary		Ammonium treated	
	Long straw	Baler with knifes	Long straw	Baler with knifes
Straw big bale	1	1	3	1
Straw round bale	1-2	1	3	1
Hay big bale	1-2	1	3	1
Hay round bale	2	1	3	1
Grass straw big bale	2	1	3	1
Grass straw round bale	3	1	3	1

Machine capacity depends on material choice, above table is only to show what is possible, it says nothing about the resulting capacity from this use.

Fresh harvested straw:
The straw should be placed at stock for at least 1 month before using, newly harvested straw can be like hay, and is more difficult to work with.

Maintenance for MTX

Oil Exchange:

Position	Quantity	Producer/Type	Interval
Planetary gear: MTX 18, 22, 30 Planetary gear MTX 42, 50	2x 6,5 L 2x 12 L (2522) 2x 12,5L (310)	SAE 85W/140 - Q8 Goya 220 - Ore other similar oil	First time after 100 hour here after every 4000 hours
Flat gear on bale breaker augers	2x 10L	Omala S4 WE 320 Ore other similar oil	
Hydraulic	5 L	Tellus 22	1-2 times a year depending on how frequent it is used

Greasing:

Position	Quantity	Lubricatuion	Interval
Other bearings	Appropriate, 1 squeeze.	Shell Calithia EP T2	Every 100 hours - **Notice!** Do not over grease.

Tightening bolts: All bolts and mothers must be tightened after the first 10 hours.