KAWA GmbH
Leiterplattentechnik / Industrievertretung

Drawing N° 25-18371-7-A1

Fexible Solar Cell Cleaner
Combi Line based Roll to Roll Version

Working direction	: left-right
Frequency controlled Conveyor drive	: n.a.

CONTENTS:

1. Equipment Data

1.1 Series — Combi-line

Fexible Solar Cell Cleaner

- Working Width	650 mm
- Working Height	900 mm +/- 15 mm
- Machine Length	6550 mm

1.2 Conveyor speed

- Operation Speed	0.50 m/min
- Range of Conveyor Speed	0.1 - 3.0 m/min

1.3 Working direction

- Working Direction	left-right

1.4 Specification of Panels

- Maximum Panel Width	350 mm
- Maximum Panel Length	roll to roll mm
- Minimum Panel	n.a. mm
- Maximum Panel Thickness	0.100 mm
- Minimum Panel Thickness	0.100 mm
- Base Material	Aluminiumfolie

1.5 Notes

- dosing will be done by volume for set-up and contin. dosing during operation
- all incomming water volumes for operation will be recorded by PLC through föwmeter with Reed contact chain
- IPA volumes will be defined by dosing pump calibration
- the program contains a drain function of all tanks by solenoid valves
- automatic cleaning cycle for module 2, 5 and 7
- new set-up to be made with level control and Reed contact chain
- processtimes have to be checked and released by the customer
- there is no conveyor drive in the machine, Al foil will be implemented manually at start-up
- The length of the connector cable from control cabinet to machine which is included in the
- quotation can be found under "Ancillaries". Additional required cable is available for

- Euro 130,- / meter.

****

Order Modification

****

What was added

1st Modification marked with * or # vom 17.06.2005

Module 001 - Input
- 1 SW-Dosing Ball Valve with scale, PP d=20

Module 002 - Brush
- 1 Process tank
  Drain and overflow d = 50 mm,
  Size: 1,450 x 500 x 450 mm
- 1 electropneumatic PP valve d=20
- 2 electropneumatic PP valve d=20
- 2 Manual Valve PP d=20

Module 003 - Separator
- 1 Exhaust PP d=75 with throttle valve

Module 004 - Ultrasonic
- 1 Support Foot, with height adjustment

Module 005 - Ultrasonic
- 2 Level Monitor SS - Capacitive for Flood Box
- 1 electropneumatic PP valve d=20
- 1 Manual Valve PP d=20

Module 006 - Separator
- 1 Exhaust PP d=75 with throttle valve
- 3 SW-Dosing Ball Valve with scale, PP d=20

Module 007 - Cascade Rinse
- 1 Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications
- 1 KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
- 1 KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning

Module 008 - Separator
- 1 Exhaust PP d=75 with throttle valve

Module 009 - Cascade Rinse
- 1 KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
- 1 Pump - Immersion Pump 0.37 kW prepared for filter installation or pressure pipe
- 1 Filter - PP/EPDM COMpact S - 1 x 10" filter with quick-exchange device, electrical lid control
- 1 Filter - Filter cartridge 1 µm, PP
- 1 KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
- 2 SW-Dosing Ball Valve with scale, PP d=20

Ancillaries
- 1 Exhaust Connection-Motorized
- 1 throttle valve PP d=225

2nd Modification marked with ** or ## vom 27.06.2005

Module 002 - Brush
- 1 Brush Adjustment by hand valve(4x)
- 1 Position display by installed counter

3rd Modification marked with *** or ### vom 29.06.2005

Module 002 - Brush
- 1 Pump - Dosing pump 0 - 7.2 l/h
  with suction and pressure hose
- 3 Time relay

Module 005 - Ultrasonic
- 1 Pump - Dosing pump 0 - 7.2 l/h
  with suction and pressure hose
- 3 Time relay

4th Modification marked with **** or #### vom 12.07.2005
- 1 Modification delivery date

5th Modification marked with ***** or ##### vom 12.07.2005

Module 007 - Cascade Rinse
- 1 Installed the second heat form K3 in K1

Module 009 - Cascade Rinse
- 1 Installed the second heat form K3 in K1

6th Modification marked with ****** or ###### vom 20.07.2005

Module 001 - Input
- 1 Support Foot, with height adjustment

7th Modification marked with ******* or ####### vom 29.07.2005

Ancillaries
- 1 Unwinder, 120 W, supply cable 24 V - 1 Amp
- 1 Rewinder, 180 W, supply cable 24 V- 2,5 Amp
- 5 Potential free contact, 24 V
- 4 Potential free contact, 0 - 20 mA
- 9 Plug, 25 A, 1 phase

What was deleted

Deleted Parts of 1st Modificaton vom 17.06.2005 DE

Module 001 - Input
- 1 SW-Dosing Ball Valve with scale, PP/Viton d=20

Module 002 - Brush
- 1 Process tank
  2 big cleaning lid, quick-release connection
  Drain and overflow d = 50 mm,
  Size: 1,450 x 500 x 450 mm
- 1 Electropneumatic Valve d=20 PVC

Module 006 - Separator
- 3 SW-Dosing Ball Valve with scale, PP/Viton d=20

Module 009 - Cascade Rinse
- 1 Safety thermostat for heating or cooling
  without light, TÜV inspected
- 2 SW-Dosing Ball Valve with scale, PP/Viton d=20

Ancillaries
- 1 AZM - Exhaust Connection-Motorized
- 1 Exhaust PP d=75 with throttle valve
- 9 Exhaust connection PVC, d=75

Deleted Parts of 2nd Modificaton vom 29.06.2005

Module 002 - Brush
- 1 Pump - Dosing pump 2.5 l/h for antifoam unit

Module 005 - Ultrasonic
- 1 Pump - Dosing pump 2.5 l/h for antifoam unit

Deleted Parts of 2nd Modificaton vom 12.07.2005

Ancillaries

- 4 Cable connection to control cabinet

2. Technical Data

2.1 Consumption Data

2.1.1 Electrical Connection Data

3 Phases Alternating Current AC	400V +/- 10%, 50Hz
Control Voltage	24 V DC

2.1.2 Power Consumption of Equipment

71.78 kW (subject to change)

2.1.3 Capacity of Equipment

~ 20 m²/h at 100 % space use

~ 15 m²/h at 75 % space use

2.2. Module Description

Item	Quantity	Description	Total price
1		**Module 001 - Input**	
1.1		**TRE 1 - 375 mm, consisting of:**	
	1	- TRE 1 PP/SS Entry module with emergency stop switch	
	1	- Exhaust Connection d=75 mm SS, TRE-TRA-TRK With 2 squeegee rollers	
	1	- Exhaust, Exhaust Damper for Exhaust Connection	
	1	- distribution pipe with 27 nozzles in distance of 13 mm	
	1	- SW-Dosing Ball Valve with scale, PP d=20 *	
	1	- Service Unit for Electropneumatic Valves with pressure reducer and pressure control	
	1	- Support Foot, with height adjustment ******	
1.2		**Transport system Standard for TRE 1, consisting of:**	
	1	- TRE/TRA/TRK 1 Standard transport in PP/SS	
2		**Module 002 - Brush**	
2.1		**Brush system**	
	1	- BON/BUN 2 Brush Module double - sided in PP/SS	
	4	- BON/BUN - Brush seat, VA, for one brush	
	4	- Frequency controller for max. 0.37 kW motors	
	4	- BON/BUN Brush Perlon 120 mm/Bristles 0.08 SS Core (suitable for brush arbor)	
	1	- Brush Adjustment by hand valve(4x) **	
	1	- Position display by installed counter **	
2.2		**Transport system, consisting of:**	
	1	- BON/BUN Standard Transport PVC/SS, without Conveyor Drive	
2.3		**Spray system for a Brush, consisting of:**	
	1	- Spray Frame for Wetting pipes for the Brushes	
	6	- BON/BUN - spray pipe with quick-release connection	
	1	- Pressure gauge digital without current output	
2.4		**Process tank consisting of:**	
	1	- Process tank Drain and overflow d = 50 mm, Size: 1,450 x 500 x 450 mm *	
	1	- Temperature probe in SS	

1	-	Heating 4.0 kW SS
1	-	Safety thermostat for heating or cooling without light, TÜV inspected
1	-	electropneumatic PP valve d=20 - Zulauf Reinigungsprogramm*
1	-	Pump - Immersion Pump 0.37 kW prepared for filter installation or pressure pipe
1	-	Filter - PP/EPDM COMpact S - 3 x 10" filter quick-exchange type,electrical lid control
3	-	Filter - Filter cartridge 1 µm, PP
1	-	Flow Meter - Reed Contact Chain Includes: output signal 4 - 20 mA
1	-	Flow meter 60 - 640 l/h, includes regulator valve
1	-	Flow Meter-Limit Contact Min. - PLC
1	-	Flow meter 200 - 2500 l/h, includes regulator valve
1	-	electropneumatic PP valve d=20
2	-	electropneumatic PP valve d=20 *
2	-	Manual Valve PP d=20 *
1	-	Pump - Dosing pump 0 - 7.2 l/h with suction and pressure hose - Dosierung Seife oder IPA***
3	-	Time relay ++ 1xintervall, 1xdosierzeit, 1x Ansatzzeit ++ ***
1	-	Reed Contact Chain for installation in Tank
1	-	Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications
1	-	Electropneumatic PP valve, d=50 ++ automatic drain ++

3 Module 003 - Separator

3.1 MTM - 225 mm, consisting of:

1	-	MTM - PP/SS - Medium Separation Module with lid safety interlock
1	-	Exhaust PP d=75 with throttle valve *

3.2 Transportsystem standard for MTM consisting of:

1	-	MTM - Standardtransport in PP/SS

3.3 Air Knife consisting of:

3	-	distribution pipe with 27 nozzles in distance of 13 mm ++2x top, 1xbottom ++
3	-	SW-Dosing Ball Valve with scale, PP/Viton d=20

4 Module 004 - Ultrasonic

4.1 **WSM 3 - 875 mm consisting of:**

1 - WSM-W 3 US PP/SS - Process Module with Flood Box and lid safety interlock, prepared for the installation of ultrasonic transducers
1 - Cascading connection - WMT - WSM
1 - WMT-W / WSM-W - Continuous Flood Box between two modules
1 - Cleaning device for DS Modules, Rotation unit for automatic cleaning of Sweller or Permanganate Modules
1 - Support Foot, with height adjustment
*

excl. 4.2 **Spray system for a WSM 3, consisting of:**

1 - High frequency cable l = 25 m
2 - Ultrasonic generator 1 kW, 120 KHZ
2 - Ultrasonic Transducer with 1000 W in SS, 120KHZ

4.3 **Transport system Standard, consisting of:**

1 - WSM-W 3 Standard Transport PP/SS

5 Module 005 - Ultrasonic *

5.1 **WMT 4 - 1125 mm consisting of:**

1 - WMT-W 4 US PP/SS - Process Module with Flood Box, tank as substructure and lid safety interlock, prepared for installation of ultrasonic transducers
1 - Overflow Pipe d=50
1 - Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications
1 - Reed Contact Chain for installation in plastic modules
1 - Exhaust PP d=75 with throttle valve
1 - Cleaning device for DS Modules, Rotation unit for automatic cleaning of Sweller or Permanganate Modules
1 - Electropneumatic PP valve, d=50
++ automatic drain ++
2 - Level Monitor SS - Capacitive for Flood Box
*

excl. 5.2 **Spray system for WMT 4, consisting of:**

3 - Ultrasonic Transducer with 1000 W / 40 kH in SS
1 - Ultrasonic generator 3 kW
1 - High frequency cable l = 25 m

5.3 **Transport system Standard, consisting of:**

1 - WTM-W 4 Standard transport PP/SS

5.4 **Pump system prepared for the installation of a filter, consisting of:**

1 - Pump - Immersion Pump 1.8 kW prepared for filter installation or pressure pipe
1 - Filter - PP/EPDM COMpact S - 3 x 10" filter quick-exchange type,electrical lid control

3 - Filter - Filter cartridge 1 µm, PP

5.5 **Temperature control, consisting of:**

1 - Safety thermostat for heating or cooling without light, TÜV inspected
1 - Temperature probe in SS
1 - Electropneumatic Valve d=20 PVC
1 - Cooling coil SS without electropneumatic valve
2 - Heating 4.0 kW SS

5.6 **Dosing system consisting of:**

1 - Pump - Dosing pump 0 - 7.2 l/h with suction and pressure hose
- Dosierung Seife oder IPA***
3 - Time relay
++ 1xintervall, 1xdosierzeit, 1x Ansatzzeit ++ ***
1 - Liquid Suction Armature in PP / 50 l/h with level switch
1 - electropneumatic PP valve d=20
1 - electropneumatic PP valve d=20
*
1 - Manual Valve PP d=20
1 - Manual Valve PP d=20
*
1 - Flow meter 60 - 640 l/h, includes regulator valve
1 - Flow Meter - Reed Contact Chain
Includes: output signal 4 - 20 mA

5.7 **Autom. cleaning**

++ D. I. water ++
1 - electropneumatic PP valve d=20
1 - Manual Valve PP d=20

6 Module 006 - Separator

6.1 **MTM - 225 mm, consisting of:**

1 - MTM - PP/SS - Medium Separation Module with lid safety interlock
1 - Exhaust PP d=75 with throttle valve
*

6.2 **Transportsystem standard for MTM consisting of:**

1 - MTM - Standardtransport in PP/SS

6.3 **Air Knife consisting of:**

3 - distribution pipe with 27 nozzles in distance of 13 mm
++2x top, 1xbottom ++
3 - SW-Dosing Ball Valve with scale, PP d=20
*

7 Module 007 - Cascade Rinse

7.1 **KSM 3 - 875 mm consisting of:**

1 - KSM 3 PP/SS Cascade Rinse Module and lid safety

interlock
1 - Overflow Pipe d=50
2 - Electropneumatic PP valve, d=50
++ automatic drain ++
1 - Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications
*

7.2 **Cascade 1 in KSM 3, consisting of:**
4 - Spray pipe PVC straight with 9 quick-release nozzles
1 - Pump - Immersion Pump 0.37 kW prepared for filter installation or pressure pipe
1 - Filter - PP/EPDM COMpact S - 1 x 10" filter with quick-exchange device, electrical lid control
1 - Filter - Filter cartridge 1 µm, PP
1 - KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
*
1 - KSM 3 Standard transport in PP/SS
1 - Flow meter 400 - 4000 l/h, includes regulator valve
1 - Flow Meter-Limit Contact Min. - PLC

7.2.5 **Temperature control, consisting of:**
2 - Heater 4.5 kW, SS
1 - Temperature probe in SS
1 - Safety thermostat for heating or cooling without light, TÜV inspected
1 - Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications

7.2.6 **Dirt control system in KSM 3, consisting of:**
1 - Conductivity measuring device, variable measuring range 0.05 to 20 µS/cm
1 - electropneumatic PP valve d=20

7.3 **Cascade 2 in KSM 3, consisting of:**
++ air chamber ++
2 - distribution pipe with 27 nozzles in distance of 13 mm
2 - SW-Dosing Ball Valve with scale, PP/Viton d=20
1 - KSM 3 Standard transport in PP/SS
1 - Exhaust PP d=75 with throttle valve

7.4 **Cascade 3 in KSM 3, consisting of:**
4 - Spray pipe PVC straight with 9 quick-release nozzles
1 - Pump - Immersion Pump 0.37 kW prepared for filter installation or pressure pipe
1 - Filter - PP/EPDM COMpact S - 1 x 10" filter with quick-exchange device, electrical lid control
1 - Filter - Filter cartridge 1 µm, PP
1 - KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
*

1 - KSM 3 Standard transport in PP/SS
1 - Flow meter 400 - 4000 l/h, includes regulator valve
1 - Flow Meter-Limit Contact Min. - PLC
1 - Heater 4.5 kW, SS
1 - Safety thermostat for heating or cooling without light, TÜV inspected
1 - Temperature probe in SS
1 - Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications

8 Module 008 - Separator

8.1 MTM - 225 mm, consisting of:

1 - MTM - PP/SS - Medium Separation Module with lid safety interlock
1 - Exhaust PP d=75 with throttle valve
*

8.2 Transportsystem standard for MTM consisting of:

1 - MTM - Standardtransport in PP/SS

8.3 Air Knife consisting of:

2 - distribution pipe with 27 nozzles in distance of 13 mm
2 - ball valve for dosing with scale, PP, d=20

9 Module 009 - Cascade Rinse

9.1 KSM 3 - 875 mm consisting of:

1 - KSM 3 PP/SS Cascade Rinse Module and lid safety interlock
1 - Overflow Pipe d=50
2 - Electropneumatic PP valve, d=50
++ automatic drain ++

9.2 Cascade 1 in KSM 3, consisting of:

4 - Spray pipe PVC straight with 9 quick-release nozzles
1 - Pump - Immersion Pump 0.37 kW prepared for filter installation or pressure pipe
1 - Filter - PP/EPDM COMpact S - 1 x 10" filter with quick-exchange device, electrical lid control
1 - Filter - Filter cartridge 1 µm, PP
1 - KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
*
1 - KSM 3 Standard transport in PP/SS
1 - Flow meter 400 - 4000 l/h, includes regulator valve
1 - Flow Meter-Limit Contact Min. - PLC

9.2.5 Temperature control, consisting of:

2 - Heater 4.5 kW, SS
1 - Temperature probe in SS
1 - Safety thermostat for heating or cooling

without light, TÜV inspected
1 - Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications

9.2.6 **Dirt control system in KSM 3, consisting of:**

1 - Conductivity measuring device, variable measuring range 0.05 to 20 µS/cm

9.3 **Cascade 2 in KSM 3, consisting of:**

++ air chamber ++
2 - distribution pipe with 27 nozzles in distance of 13 mm
2 - SW-Dosing Ball Valve with scale, PP/Viton d=20
1 - KSM 3 Standard transport in PP/SS
1 - Exhaust PP d=75 with throttle valve

9.4 **Cascade 3 in KSM 3, consisting of:**

4 - Spray pipe PVC straight with 9 quick-release nozzles
1 - KSM 3 Standard transport in PP/SS
1 - Pump - Immersion Pump 0.37 kW prepared for filter installation or pressure pipe
*
1 - Filter - PP/EPDM COMpact S - 1 x 10" filter with quick-exchange device, electrical lid control
*
1 - Filter - Filter cartridge 1 µm, PP
*
1 - KSM - Cleaning hole, PP, in cascade zone, necessary for filter cleaning
*
1 - Flow meter 400 - 4000 l/h, includes regulator valve
1 - Flow Meter-Limit Contact Min. - PLC

9.4.5 **Temperature control, consisting of:**

1 - Heater 4.5 kW, SS
1 - Temperature probe in SS
1 - Safety thermostat for heating or cooling without light, TÜV inspected
1 - Dry-Run protection or level control for installation in plastic modules, without control light, for PLC applications

9.4.6 **Flow heating system for a KSM 3, consisting of:**

1 - Flow Heater 12 kW

Flow rate	: 50 - 300 l/h
Exit temperature	: 45°C
Temp. increase	: max. 35°C

Special version for deionised water
including electronic temperature control
and temperature regulator for adjustment of
required exit temperature,
including temperature LCD-Indication

9.5 **Inlet system for a KSM 3 Module, consisting of:**

1 - Flow meter 60 - 640 l/h, includes regulator valve

1 - Flow Meter - Reed Contact Chain
Includes: output signal 4 - 20 mA
2 - electropneumatic PP valve d=20
2 - SW-Dosing Ball Valve with scale, PP d=20
*
1 - Conductivity measuring device, variable measuring range 0.05 to 20 µS/cm

10 Module 010 - Dry

10.1 TKM 4 - 1125 mm, consisting of:

1 - TKM 4 PP/SS Dryer
with Pt 100 and Safety Thermostat
2 - Exhaust Connection d=90 without damper
1 - TKM Recirculation blower

10.2 Transport system Standard, consisting of:

1 - TKM 4 Standard transport system PP/SS
2 - TKM Dry Jet with 1 blower 3.0 kW SS including 1 suction filter
4 - TKM Air Filter
Pressure side for cleanroom use (Class H 14)
1 - Frequency controller for max. 4 kW motors
2 - Blower for Airknives 3KW

11 Ancillaries

16 - Cable connection to control cabinet
1 - Lamp - Flash lamp 3 colours
1 - Alarm-signal horn with reset key
1 - Exhaust Connection-Motorized
*
1 - throttle valve PP d=225
*
1 - Transport without main drive shaft as well as reduced transport rollers according to the assembly drawing
1 - Unwinder, 120 W, supply cable 24 V - 1 Amp
#######
1 - Rewinder, 180 W, supply cable 24 V- 2,5 Amp
#######
5 - Potential free contact, 24 V
#######
4 - Potential free contact, 0 - 20 mA
#######
9 - Plug, 25 A, 1 phase
#######

PLC cost

+ Packing cost

+ Freight cost

+ Transport insurance

+ Installation cost

Net value
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2.3 Description of Hard- and Software

PLC Siemens Simatic S7 for control of
process machine
Visualization for control of machine and visualization of
process. Operation and display in German or English.
Versions in other languages are available against
additional costs.

- PC with 15" monitor for machine control according to specification
- Graphical display of machine
- Control of machine via PC keyboard, PC Mouse and monitor
- Visualization of messages, warnings or errors
- Recording of warnings, errors and parameters on printer and hard disk
- Weekly timer for programming of Start times, Stop times and Pre-heating times
- Programm setting
- Input security with 3 different password levels
- Reasonableness test of input values
- modem included