

Annex 1

CPD Φ 3000mm Drum Twister Machine

1 Application

The machine is mainly operating for laying up conductors and power cables of great cross section and long length & making steel wire armor cable.

2 Main features

- 2.1 PLC and touch screen control the whole line.
- 2.2 Rotating payoff driving motors, Taping head driving motor, rotating caterpillar driving motor and traversing motor are all AC inverter controller by frequency converter.
- 2.3 The traversing pitch is set and adjusted on the touch screen. Left or right direction and Point move or fast move is also available.
- 2.4 The pay-offs are driven by separate motors. They can run individually or synchronized with take up.

3 Main Technical Data

3.1	Stranding O.D.	Φ 25~ Φ 130mm
3.2	Stranding pitch	200~8000mm
3.3	Nos of steel wire	96
3.4	Steel wire diameter	Φ 1.5~ Φ 4.0mm
3.5	Max. rev. of drum twister	40r/min
3.6	Max. line speed	45m/min
3.7	Max. pulling force	6000Kg
3.8	Non-metal Taping rotation	800r/min
3.9	Non-metal Taping pitch	20-208mm Step-less adjustable
3.10	Metallic Taping rotation	400r/min
3.11	Metallic Taping pitch	Step-less adjustable
3.12	Pay off bobbin	Φ 2000mm
3.13	Take up bobbin	Φ 3000mm
3.14	Filling rope	
	3.14.1 Filler rope ball	O.DxBoresxO.W. Φ 400x Φ 22x360mm (10 balls)
	3.14.2 Filler rope roll	Dia.xBoresxO.W. Φ 800x Φ 52x320mm(4 rolls)
3.15	Rotating pay-off motor	30kw x 1 + 22kw x4 (AC inverter motor)
3.16	Non-metal Taping motor	15KW(AC inverter motor)
3.17	Metallic Taping motor	18.5KW(AC inverter motor)
3.18	Caterpillar motor	2x22KW(AC inverter motor)
3.19	Rotating Take up motor	55KW(AC inverter motor)
3.20	Central height	1000mm

4 Composition of Line

4.1	Φ 2500mm Rotating pay-off	1 set
4.2	Φ 2000mm Rotating pay-off	4 sets
4.3	Reel loading/ Unloading Hydraulic Lifer	5 sets
4.4	Cone type wire guiding stand	5 sets
4.5	Cable supporting stands	7 sets
4.6	Roller supporters	2 set
4.7	Filler payoff stand	2 sets
4.8	Concentrated sector correction device	1 set
4.9	Longitudinal taping unit	3 set
4.10	3-row die holder	1 set
4.11	Φ 600mm Non-metal Taping device	1 set
4.12	Bobbin/ reel Steel Wire Armor head and P/O	1 set (With single row die holder)
4.13	Φ 600mm Non-metal Taping Device	1 set
4.14	Φ 630mm Metallic Taping Device	1 set
4.15	6T Rotating caterpillar	1 set
4.16	Φ 3000mm Rotating take-up	1 set
4.17	Reel loading/ Unloading Hydraulic Lifer for T/U	1 set
4.18	Electric control system	1 set
4.19	Air and Pneumatic system	1 set

5 Detailed Description

5.1 Φ 2500mm rotating pay-off x 1

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|-------|-----------------|-------------------|
| 5.1.1 | Pay-off bobbin | Φ 2500mm |
| 5.1.2 | Loading weight | 12T |
| 5.1.3 | Max. rev. speed | 40r/min |
| 5.1.4 | Driving motor | 30KW(AC inverter) |
| 5.1.5 | Pay-off tension | 10~150kg |
- 5.1.6 The pay-off is of fork type cantilever, driven by separate motor. And it can jog or rotate synchronized with take-up, or to be fixed. It can also be controlled by manual.
- 5.1.7 The pay-off tension is pneumatically controlled and adjustable anytime.
- 5.1.8 The drum is clamped without shaft, driven by separate motor.
- 5.1.9 Fork type Hydraulic lifter for loading and unloading drum with hydraulic platform. And it is equipped with manual sliding trolley.
- 5.1.10 Pneumatic brake.
- 5.1.11 The payoff has an operation table, which could control jog or stop.

5.2 Φ 2000mm rotating pay-offs x4

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|-------|-----------------|-------------------|
| 5.2.1 | Pay-off bobbin | Φ 2000mm |
| 5.2.2 | Loading weight | 8T |
| 5.2.3 | Max. rev. speed | 40r/min |
| 5.2.4 | Driving motor | 22KW(AC inverter) |
| 5.2.5 | Pay-off tension | 10~150kg |
- 5.2.6 The pay-off is of fork type cantilever, driven by separate motor. And it can jog or rotate synchronized with take-up, or to be fixed. It can also be controlled by manual.
- 5.2.7 The pay-off tension is pneumatically controlled and adjustable anytime.
- 5.2.8 The drum is clamped without shaft, driven by separate motor.
- 5.2.9 Fork type Hydraulic lifter for loading and unloading drum with hydraulic platform. And it is equipped with manual sliding trolley.
- 5.2.10 Pneumatic brake.
- 5.2.11 The payoff has an operation table, which could control jog or stop.



5.3 Cone type wire guiding stand

- 5.3.1 Each payoff is equipped with this unit.
- 5.3.2 Cone type passing die, available for making segment conductor.



5.4 Guiding roller stand

5.4.1 Two payoffs nearby use one set of this unit.

5.4.2 The stand is composed of guiding wheel and guiding roller.



5.5 Filler payoff stand

5.5.1 Filling rope payoff ball size

O.D.xBorexWidth
 $\Phi 400 \times \Phi 22 \times 360 \text{mm}$ (10 balls)

5.5.2 Filling rope payoff roll size

O.D.xBorexWidth
 $\Phi 800 \times \Phi 52 \times 320 \text{mm}$ (4 rolls)

5.5.3 Up and down double layers. The lower layer has 10 balls of small size filler, and the upper one has 4 rolls of bigger size filler.

5.5.4 Total 2 sets, placed on both sides of cable moving central line.



5.6 Concentrated sector correction device

5.6.1 Sector angle

72°

5.6.2 Adjusting windage

$\pm 15^\circ$

5.6.3 5 groups of rollers for sector correction.

5.6.4 With guide roller for wire inlet, and adjusting pressing roller for wire outlet.

5.6.5 Phase detecting unit is potentiometer, with the function of overrun electric protection.

5.6.6 User provides segment conductor sector section dimension.



5.7 Longitudinal taping unit

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|-------|---|--------------------|
| 5.7.1 | Pad (Dia. ×Bore× Width) | Φ600×Φ76×(15~80)mm |
| 5.7.2 | Tape thickness | Φ0.05~0.5mm |
| 5.7.3 | Taping tension | 2.5~15kg |
| 5.7.4 | Tape material: polyester, paper, non-woven cloth, semi-conduction cloth, and etc. | |



5.8 3-rows Closing die holder

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|-------|--|-------------------------|
| 5.8.1 | The unit is equipped with 3 pcs of die holders. | |
| 5.8.2 | 3-cores, 4-cores share a same die board. The die board is equipped with sector pressing wheel separately, which can give certain tension to pay-off and ensure wires not to deflect. | |
| 5.8.3 | Wire assembling die | Φ160×160mm (O.D. ×O.W.) |



5.9 Bobbin / reel steel wire armor head and P/O



- 5.9.1 Steel pay-off bobbin Φ500mm
- 5.9.2 Steel wire max. dia. Φ1.5-Φ4.0mm
- 5.9.3 No. of steel wires 96
- 5.9.4 Including 96-reel pay-off (including the loading tools), Lay-plate, wire-guiding pulleys and wire strengtheners, loading unit, etc.
- 5.9.5 The wire pay-off stands are arranged on both side of the central line. The pay-off bobbins are put under the stand, and the bobbins are loaded on the shafts by the use of loading unit directly. The wires are guided on the top of above pay-offs.
- 5.9.6 Steel wire tension is controlled by mechanical friction, and adjustable by hands.
- 5.9.7 With single row wire die holder, the size is Φ160×160mm(O.D.xO.W.)

5.10 Φ600mm Non-metal Taping device

- 5.10.1 Passable cable dia. (max.) Φ130mm
- 5.10.2 Tape pad size(O.D×Bore×Width) Φ600mm×Φ80×(15~80)mm
- 5.10.3 No. of pads 2
- 5.10.4 Max. rev of taping head 800r/min
- 5.10.5 Taping pitch 20~208mm (step-less adjusting)
- 5.10.6 Taping motor 15KW(AC inverter motor)
- 5.10.7 Tape tension 2.5~15kg
- 5.10.8 Tape material: plastic, non-woven cloth, glass cloth, semi-conductor cloth, copper tape and etc.
- 5.10.9 It is of half-tangency type, supporting by bearings at both ends, driven by AC inverter motor, frequency converter controlled, with right or left rotation. The taping pads are inside the frame.
- 5.10.10 Tape tension is adjusted by mechanical friction with feedback, which ensures the pay off tension stable from full to low pad.
- 5.10.11 Pneumatic brake.
- 5.10.12 With tape-breaking and tape-end stop. (Proximity sensor and photoelectric switch detecting)
- 5.10.13 Axial push pull safety Guards



5.11 Φ600mm Dual-pad tapping device

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|---------|---|---------------------------------|
| 5.11.1 | Passable cable dia. (max.) | Φ130mm |
| 5.11.2 | Tape pad size(O.D×Bore×Width) | Φ600mm×Φ80×(15~80)mm |
| 5.11.3 | No. of pads | 2 |
| 5.11.4 | Max. rev of taping head | 800r/min |
| 5.11.5 | Taping pitch | 20~208mm (step-less adjusting) |
| 5.11.6 | Taping motor | 15KW(AC inverter motor) |
| 5.11.7 | Tape tension | 2.5~15kg |
| 5.11.8 | Tape material: plastic, non-woven cloth, glass cloth, semi-conductor cloth, copper tape and etc. | |
| 5.11.9 | It is of half-tangency type, supporting by bearings at both ends, driven by AC inverter motor, frequency converter controlled, with right or left rotation. The taping pads are inside the frame. | |
| 5.11.10 | Tape tension is adjusted by mechanical friction with feedback, which ensures the pay off tension stable from full to low pad. | |
| 5.11.11 | Pneumatic brake. | |
| 5.11.12 | With tape-breaking and tape-end stop. (Proximity sensor and photoelectric switch detecting) | |
| 5.11.13 | Axial push pull safety Guards. | |



5.12 Φ630mm Metallic tapping device

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|--------|---------------------------------------|-------------------------------|
| 5.12.1 | Applicable cable dia. | Φ130mm |
| 5.12.2 | Tape pad dia. | Φ630mm |
| 5.12.3 | Tape pad filler size (O.D×Bore×Width) | Φ200mm×Φ120×(15~60)mm(6 sets) |
| 5.12.4 | No. of reels | 2 |

- 5.12.5 Max. taping head rotation. 450r/min
- 5.12.6 Taping pitch continuously adjusting
- 5.12.7 Tape tension 2.5~50kg
- 5.12.8 Taping motor 18.5KW(ACVF)
- 5.12.9 Tape material steel tape
- 5.12.10 It is of half-tangency type, both supporting, driven by individual AC inverter motor and controlled by frequency converter, with right or left rotation.
- 5.12.11 Tape tension is adjusted by mechanical friction with feedback which keeps constant tension from full bobbin to low.
- 5.12.12 Pneumatic brake.
- 5.12.13 With end-breaking stop.
- 5.12.14 Axial push pull safety Guards.



5.13 6T Rotating caterpillar

- 5.13.1 Belt effective length 3730mm
- 5.13.2 Belt width 141mm
- 5.13.3 Max. pulling force 6000kg
- 5.13.4 Max. line speed of hauling-off 45m/min
- 5.13.5 Max. rev. 40r/min
- 5.13.6 Pulling force by motor 2x22KW(AC inverter motor)
- 5.13.7 Up and down multi-wedge belts (grooved type), pneumatic clamping and pneumatic pressing the cable.
- 5.13.8 Driven by separate AC inverter motor, with step-less line speed adjustment.
- 5.13.9 Rotating body of caterpillar unit and take-up are driven by same motor and synchronized through mechanical transmission.
- 5.13.10 Pneumatic brake.
- 5.13.11 With electronic meter counter, accuracy≤0.5%.



5.14 Φ3000 Rotating take-up

- 5.14.1 Take-up bobbin Φ3000mm
- 5.14.2 Max. rev 40r/min

- 5.14.3 Stranding pitch 200~8000mm
- 5.14.4 Max. loading weight 20T
- 5.14.5 Traversing pitch 55KW(AC inverter motor)
- 5.14.6 The rotary fork type take-up is supported on the under-rollers, driven by separate motor with right and left rotation and the stop.
- 5.14.7 Clamping the bobbin without shaft, with separate motor driving.
- 5.14.8 With AC inverter motor for rewinding. The take-up tension up to 250kg can be adjusted and on the touch screen. With forward or reverse jogging.
- 5.14.9 AC inverter motor is for traversing which is controlled by frequency converter. The traversing pitch is set and adjusted on the touch screen. Left or right and quick traversing is also available. Left, right directions and jog can be set on the touch screen.
- 5.14.10 Pneumatic brake.
- 5.14.11 With fork hydraulic lifter for loading and unloading the drum.



5.15 Electric control system

- 5.15.1 Power supply: 3-phase, 4-wire,380V (±10%), 50HZ, and single phase control voltage is 220V.
- 5.15.2 The overall machine is handled by PLC and touch screen.
- 5.15.3 All the data is displayed, changed and set on the screen.
- 5.15.4 Electric protection are provided as:
 - 5.15.4.1 Level protection for all pay-offs and take-up.
 - 5.15.4.2 Fault alarming for all drivers
 - 5.15.4.3 Reset protection for all hydraulic lifters
 - 5.15.4.4 Over-ranging for traversing
 - 5.15.4.5 Protection cover safety
 - 5.15.4.6 Low-pressure protection for air
 - 5.15.4.7 Tape-breaking and Tape-End stop
- 5.15.5 The machine has remote communication module with function of on-line technical service(the buyer should prepare the SIM card / Wi-Fi)

6 The air supply of the user must be:

- 6.1 Air pressure 0.6MPa
- 6.2 Air volume 1.0m³/min
- 6.3 Compressed air shall be dry and clean without any dust and dirt.

- 7 Total Electricity Load 241KVA**
- 8 Running Noise ≤85dB**
- 9 Ambient temperature 0~40°C**

10 Humidity

5%~90%

11 Sub-suppliers:

- 11.1 HRB, ZWZ, LYC brand – Chinese bearings
- 11.2 Pneumatic components : AirTAC products, Taiwan Brand (but Cylinders on Rotating Caterpillar are china brand).
- 11.3 **SIEMENS- AC motors (delivered without SIEMENS LOGO)**
- 11.4 **SIEMENS AC Drivers.**
- 11.5 SIEMENS PLC. S7-1500 or equivalent
- 11.6 SIEMENS Touch screen.TP1200 or equivalent
- 11.7 Electrical control cabinets are manufactured as per Rittal Standard.
- 11.8 The main low voltage components: Chinese Famous Products

12 Technical documents:

- 12.1 Layout
- 12.2 Foundation
- 12.3 Transmission sketch
- 12.4 Lubricant Schematic
- 12.5 Electric duct
- 12.6 Wiring program
- 12.7 Electric principle
- 12.8 Wiring on machine map
- 12.9 Electric panel
- 12.10 Operation and maintenance manual
- 12.11 AC converter manual
- 12.12 Bearing list
- 12.13 Wearing parts list

13 The operation direction: Right Hand.

14 The PAINT color as per the buyer's request.

15 The buyer provides the bobbin drawings.

16 Cables and wiring :

- 16.1 Wiring inside of Machine & Wiring inside of cabinets are supplied by seller
- 16.2 Control cables from machine parts to machine parts, machine parts to electrical cabinets, from cabinets to cabinets are supply by seller (in form of Quick plug, including plug), while, the power cable are prepared by buyer. The wiring job should be finished by buyer