for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

New Product RELEASE No.15-11E

INVERTER
FR-A800 Plus

The optimum functions for roll to roll applications are added.

A800 Plus
for Roll to Roll

GOOD DESIGN AWARD 2014

FR-A800 Plus series 2nd

Release of the new roll to roll dedicated inverter, FR-A800-R2R

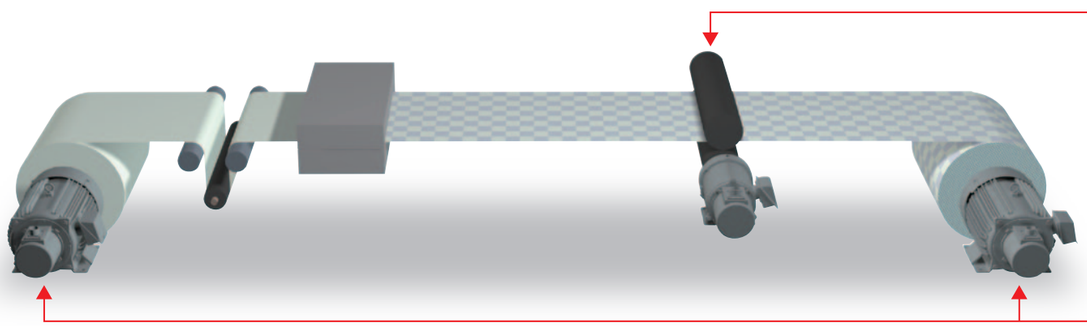
The FR-A800-R2R inverter has various dedicated functions such as winding diameter calculation, providing stable winding/unwinding control independently.

A800 Plus

A new lineup of dedicated inverters for specialized fields are born! Plus! The optimum functions for each dedicated field are added to the already high performance and high functionality FR-A800 series inverter.

Roll to roll dedicated model with functions optimum for winding/unwinding

- **System simplification**
  Stable winding/unwinding can be achieved by the inverter alone.
- **Wide range of applications**
  The inverter can be used in various systems.
- **Easy startup and adjustment**
  Parameters can be used for mechanical adjustment according to applications.



Winding/unwinding shaft
The tension is kept constant by accommodating the change in the winding diameter. Calculations are made for the acceleration/deceleration torque (inertia compensation) at a speed change and the mechanical loss torque.

Reference shaft
The line speed is controlled by driving the reference shaft.

A variety of roll to roll dedicated functions are supporting various systems.

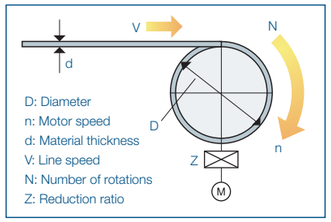
Winding diameter calculation

The present winding diameter for the winding/unwinding shaft is calculated from the actual line speed or the actual motor speed.

Winding diameter calculation function selection

The winding diameter calculation method can be selected in order to improve the tension control performance.

- Actual line speed calculation method
  The winding diameter is calculated from the line speed and the main speed (actual motor speed).
  $D = \frac{V}{\pi \times n \times Z}$
- Thickness calculation method
  The material thickness is added up to find the overall winding diameter.
  D = Initial diameter ± 2 × d × N × Z



Dancer feedback speed control

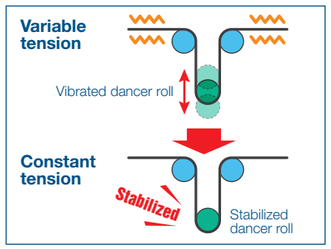
PID control is performed based on the feedback of the detected dancer roll position. Stable control can be achieved in combination with the winding diameter calculation.

Speed control proportional gain compensation

By adjusting the speed control proportional gain, response improvement is achievable according to the winding diameter.

Tension PI gain tuning

By automatically adjusting the tension PI gain, time required for adjustment is significantly cut down. Anyone can start the system easily.



Tension sensorless torque control

The output torque of a motor is controlled so that the tension applied to a material is constant by calculating the winding diameter of a roll.

Mechanical loss compensation function

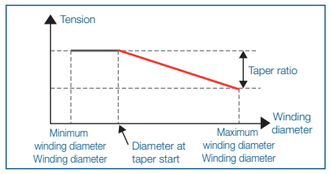
The tension applied to the material is maintained constant by raising a commanded torque to compensate mechanical loss caused by factors such as friction on the dancer roll or winding/unwinding shaft.

Inertia compensation function

During acceleration/deceleration, the tension applied to the material is maintained constant by adjusting the variable tension on the winding and unwinding sides.

Taper function

By adjusting the tension on the workpiece, it is possible to avoid imperfections such as wrinkles or deformation caused by the increase in diameter.



Application example Wire drawing machine

Dancer feedback speed control

The FR-A800-R2R is useful for winding in the wire drawing machine. High-speed winding is offered for high-inertia loads.

The wire drawing section pulls the wire at a constant speed to make the wire thinner. For the winding shaft, the inverter provides dancer feedback speed control to keep the dancer roll position, achieving constant tension winding. In addition, using the winding diameter calculation function, the circumferential speed of the winding bobbin is kept constant.

Some systems require peripheral devices such as regenerative options.

1 **Inverter** FR-A800-R2R (with the FR-A8AP*1 installed)
2 **Inverter** FR-A800-R2R (with the FR-A8AP*1 and FR-A8AZ*2 installed)
3 **Encoder-equipped motor** SF-PR-SC
4 **Dancer roll**
5 **Speed detector**

The products in the parentheses are plug-in options.
*1 Used for vector control.
*2 Used for the line speed output.

Relevant functions

Dancer feedback speed control Ⓐ Ⓑ Ⓓ
Winding diameter calculation function Ⓓ
Speed control proportional gain compensation Ⓓ
Tension PI gain tuning Ⓓ

LINEUP

• Standard model

F R - A 8 [2] [0] - [0.4K] [-1] - [ ] [R2R]

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure/function
0	Standard model

Capacity*1	Description
00023 to 06830	Inverter SLD rated current (A)
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type*2
-1	FM
-2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

Symbol	Dedicated function
R2R	Roll to roll dedicated model

Three-phase 200 V class FR-A820-[]*4	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V class FR-A840-[]*4	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	03250	03610	04320	04810	05470	06100	06830										
	110K	132K	160K	185K	220K	250K	280K										
	●	●	●	●	●	●	●										

• Separated converter type

F R - A 8 [4] [2] - [315K] [-1] - [ ] [R2R]

Symbol	Voltage class
4	400 V class

Symbol	Structure/function
2	Separated converter type

Capacity*1	Description
07700 to 12120	Inverter SLD rated current (A)
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type*2
-1	FM
-2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

Symbol	Dedicated function
R2R	Roll to roll dedicated model

Three-phase 400 V class FR-A842-[]	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
	●	●	●	●	●

*1 Models can be alternatively indicated with the inverter rated current (SLD rating).
*2 Specification differs by the type as follows.
*3 Available for the 5.5K or higher.
*4 For the 75K or higher inverter, or whenever a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option.

Type	Monitor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM: pulse train output Terminal AM: analog voltage output (0 to ±10VDC)	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA: analog current output (0 to 20mADC) Terminal AM: analog voltage output (0 to ±10VDC)	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

Release schedule Now available

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