



THYL-300C Series

# Thyristor Leonard Equipment

CC61-2617 ©



**MEIDEN**

MEIDENSHA CORPORATION

The THYL-300C is a Thyristor Leonard equipment series, which is most suitable and versatile when used with general-purpose industrial machines ranging from 3.7kW to 400kW. To permit wide use in all sorts of industrial fields, each is arranged into a convenient and independent unit.

## Applications

### ● Wire industry

Single-head wire drawing machine, stored-wire type continuous wire drawing machine, back-tension multi-stage continuous wire drawing machine, steel pulling machine, winding machine, annealer, wire strand machine.

### ● Iron and steel industries

Various auxiliary machines for rolling mills, various processing lines, steel sheet winding machines, pipe mills, table drives, slitter lines, shear lines, centrifugal forging machines, shape steel forming lines.

### ● Machine tools

High-speed lathes, roll turning lathes, presses, planers, milling machines, ram spindles.

### ● Fiber industry

Fine spinning machines, fiber finishing machines, winders, dye machines.

### ● Rubber and plastics industries

Extruding machines, calenders, conveyors.

### ● Paper industry

Paper machines, calenders, rewinders.

### ● Printing industry

Rotary presses and carriers.

### ● Cargo-handling industry

Various cranes, various winches, and elevators.

### ● Others

Pumps, blowers, compressors, wood working machines, various testers, kilns.

Note: Unit-only orders are limited to a rated output current of 460A or below.

## Features

### ● A wide range of speed control is possible with high accuracy.

Thanks to the adoption of an all-digital system based on microcomputer configuration, speed control accuracy is  $\pm 0.03\%$  over a range of 200 : 1.

### ● Improved control functions are available.

This Leonard unit has a conveniently and compactly arranged functional configuration that is flexibly applicable to a variety of control panels.

Standard equipment is provided with functions of ASR/AVR/ACR changeover, interlocked proportional operation, Character-S acceleration/deceleration, external feedback (TG possible, at 10V Max.), field gain compensation, N, I amplifier gain changeover, and others.

### ● Using a variety of I/O features, this unit can be manipulated with an orthodox sense of analog operation.

Any type of signal, digital or analog, can be used as a setting input.

### ● Improved monitor functions have facilitated adjustments and maintenance.

Using an operation panel, detected values and setting values of speed, current, voltage, etc., can be read out and/or modified. Error codes can be displayed.

### ● Protective functions are substantial.

Standard equipment is provided with protective functions against overcurrent (main and field circuits), overvoltage, overspeed, speed detector malfunction, loss of field, etc.

### ● This equipment is drift-free.

Digital operation assures freedom from thermal drift.

## Unit Applications and Type Descriptions

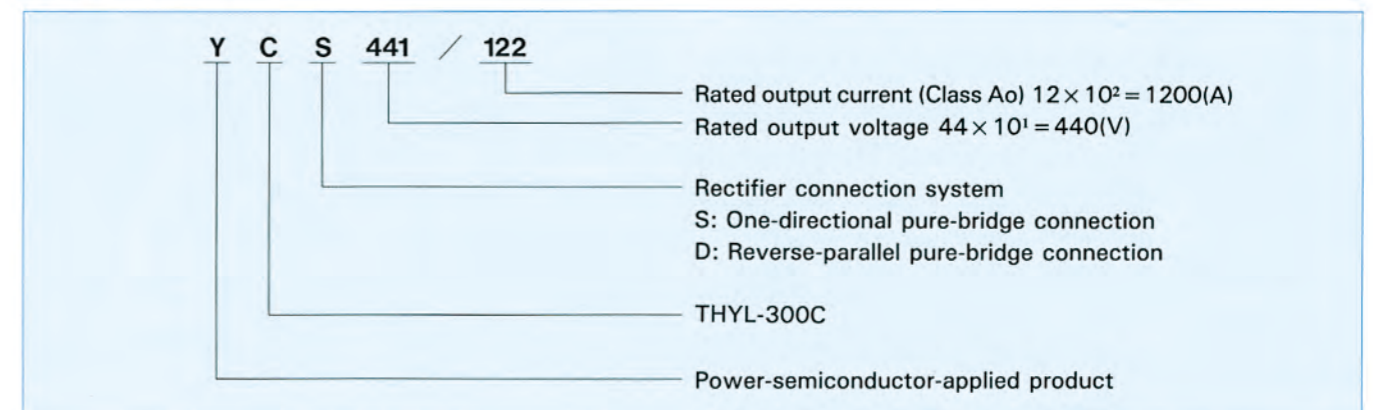
Unit application Table

Voltage (V)	Type	Rated output current (A)		Applicable motor (kW)		Remarks
		Ao.S	A	Ao.S	A	
220V	*YC□-221/250	25	22	3.7	3.7	Rating Ao : 100% Continuous S : 100% Continuous 150% 1 minute Cold start A : 100% Continuous 150% 1 minute
	*YC□-221/450	45	38	7.5	5.5	
	*YC□-221/101	100	90	18.5	15	
	*YC□-221/121	120	120	22	22	
	*YC□-221/231	230	190	37	30	
	*YC□-221/351	350	350	55	55	
	*YC□-221/501	509	460	90	75	
	YC□-221/701	700	640	—	90	
	YC□-221/911	910	820	—	—	
YC□-221/122	1200	1150	—	—		
440V	*YC□-441/250	25	22	7.5	7.5	
	*YC□-441/450	45	38	15	11	
	*YC□-441/101	100	90	37	30	
	*YC□-441/121	120	120	45	45	
	*YC□-441/231	230	190	90	55	
	*YC□-441/351	350	350	132	132	
	*YC□-441/501	509	460	200	160	
	YC□-441/701	700	640	250	250	
	YC□-441/911	910	820	315	315	
YC□-441/122	1200	1150	400	400		

Notes 1. The units marked by \* can be independently delivered.

2. The applicable motors (in kW) are simply for reference. A user should select a unit according to the rated output current.

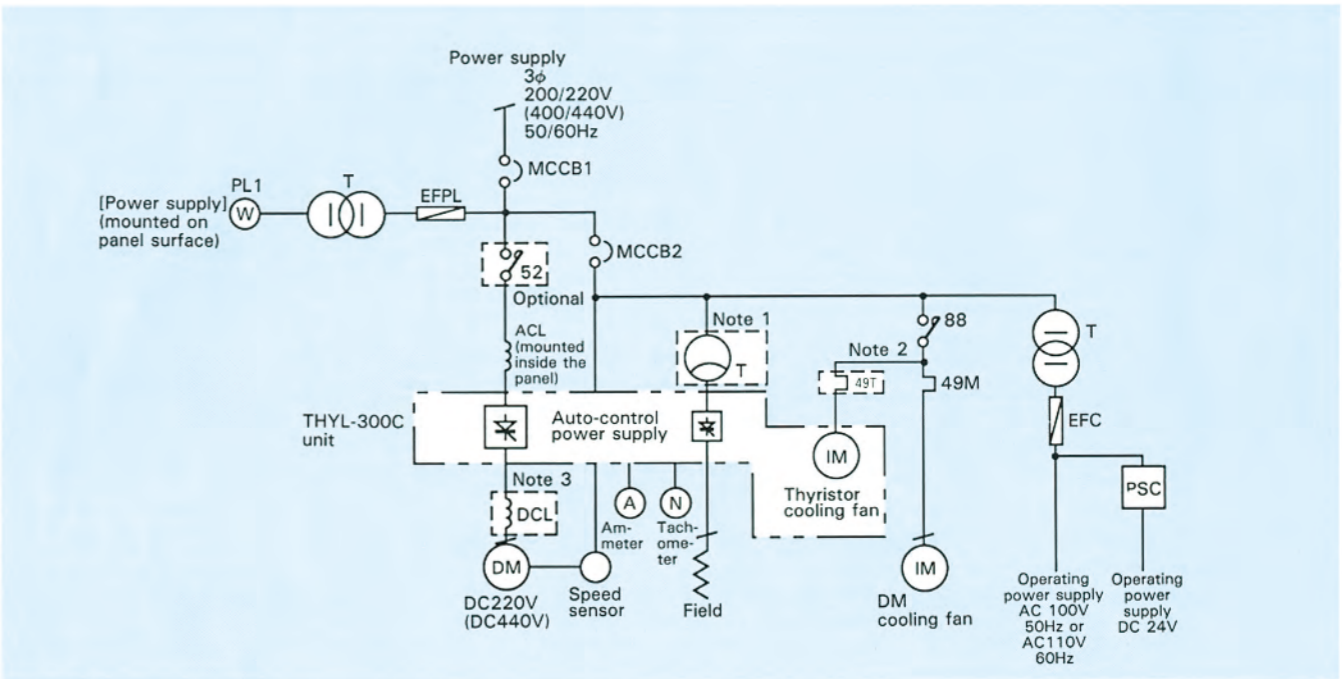
## Type Descriptions



## Standard Specifications

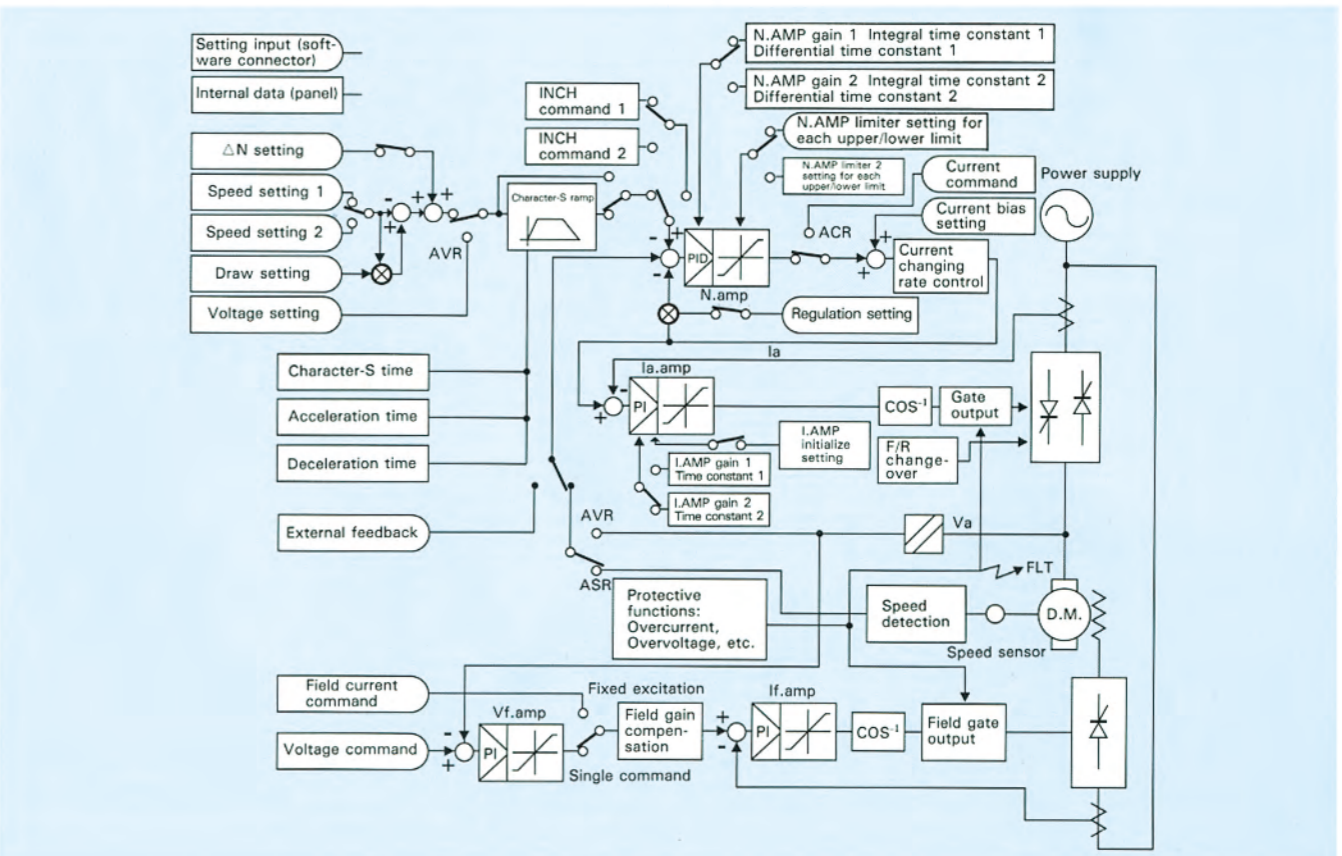
Item		Specification	Remarks
Environment	Place of use	Indoors	
	Altitude	1000m or below	
	Ambient temperature	-10~43°C (no freezing)	When accommodated in a control panel, panel's ambient temperature is 0~40°C.
	Ambient humidity	85% or below (no dew condensation)	
	Atmospheric condition	Freedom from corrosive gases and harmful dust (debris)	
	Vibration	0.2G or less	External permissible vibration
Armature block	Power supply		
	No. of input phases	3-phase	
	Rated input voltage	200/220V or 400/440V ( $\pm 10\%$ )	
	Rated input frequency	50/60Hz (+1 ~ -3Hz)	
	Rated output voltage	DC 220V or 440V	
	Rated output current	25 ~ 1200A, Class Ao	
Overcurrent durability		150% for 1 minute	Various ratings are available.
Automatic control block	Control system		Turbulence conditions: Power-supply voltage regulation: $\pm 10\%$ Thermal drift: $25 \pm 10^\circ\text{C}$ Load fluctuations: 0 ~ 100% Frequency deviation: +1 ~ -3Hz (for an encoder of 600P/R or more)
	Control range	ASR	200 : 1 (for an encoder of 600P/R or more)
		AVR	20 : 1 (or 50 : 1 with a high-accuracy option)
		ACR	50 : 1
	Control accuracy	ASR	$\pm 0.03\%$ (for an encoder of 600P/R or more)
		AVR	$\pm 3\%$ ( $\pm 1.0\%$ with a high-accuracy option)
ACR		$\pm 1\%$	
Field block	Power supply		
	No. of input phases	Single-phase	
	Rated input voltage	200/220V ( $\pm 10\%$ )	When the input voltage is 400/440V, an optional field source transformer (outside the unit) is required.
	Rated input frequency	50/60Hz (+1 ~ -3Hz)	
	Rated output voltage	DC140V	
Output		Rated output current	1 ~ 40A
Cooling unit	Cooling system	Self-cooled or forced-air-cooled	Units with a rated armature current or 25A or 45A (Class Ao) are self-cooled type.
	Power supply	Single-phase 200/220V, 50/60Hz	For a rated armature current of 509A (Class Ao) or below, and for a forced-air-cooled type, the cooling unit will be mounted atop the unit.
		3-phase 220/220V, 50/60Hz	When a rated armature current exceeds 509A (Class Ao), the cooling unit will be mounted on the standard control panel.
Color of coating		Munsell 5Y 7/1	
Standard control panel	Construction	Enclosed self-standing type (simplified dust-proof type)	With an air filter
	Color of coating	Munsell 5Y 7/1	

## Single-Line Connection Diagram

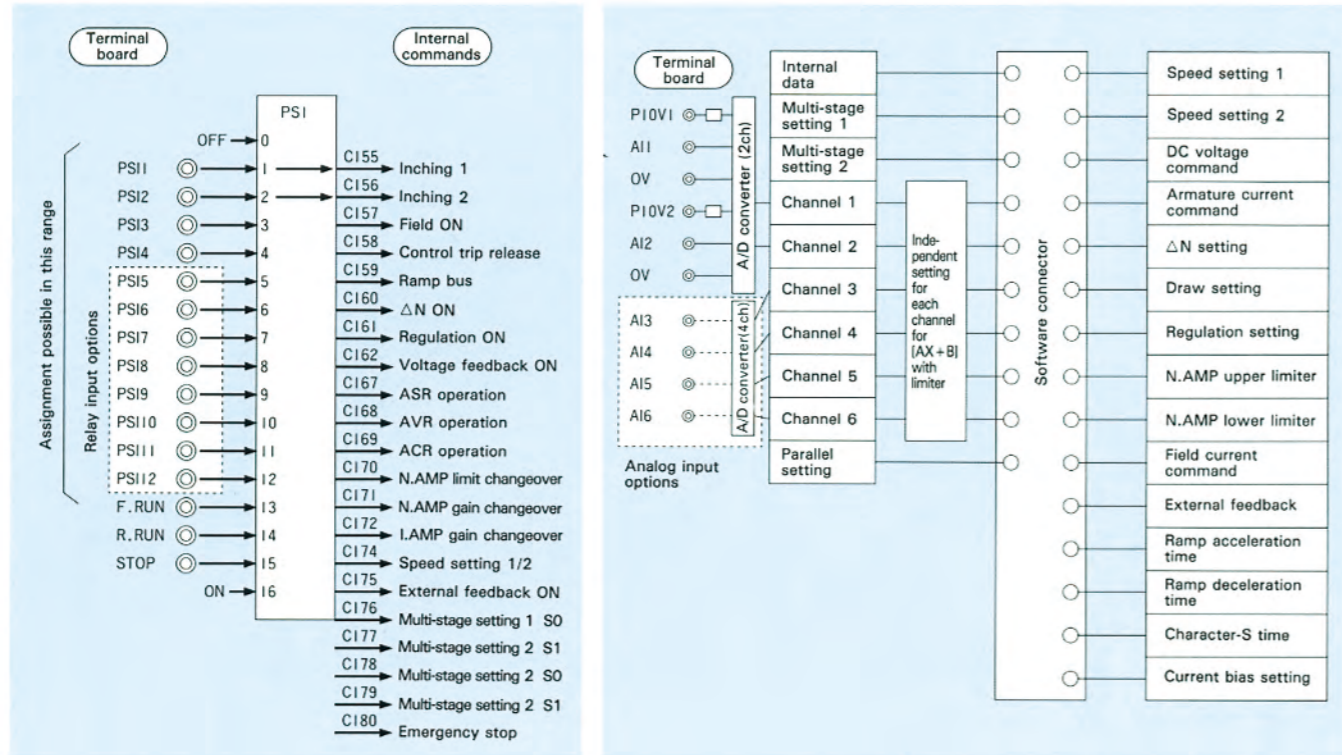


- Notes:
1. "T" is for 400V systems only.
  2. "49T" is mounted only on a unit of 700A (Class Ao) or larger.
  3. DCL is optional. Installation inside a panel involves a space requirement. If it cannot be accommodated, it will be delivered as an independent unit (with a cover).

## Control Circuit Block Diagram

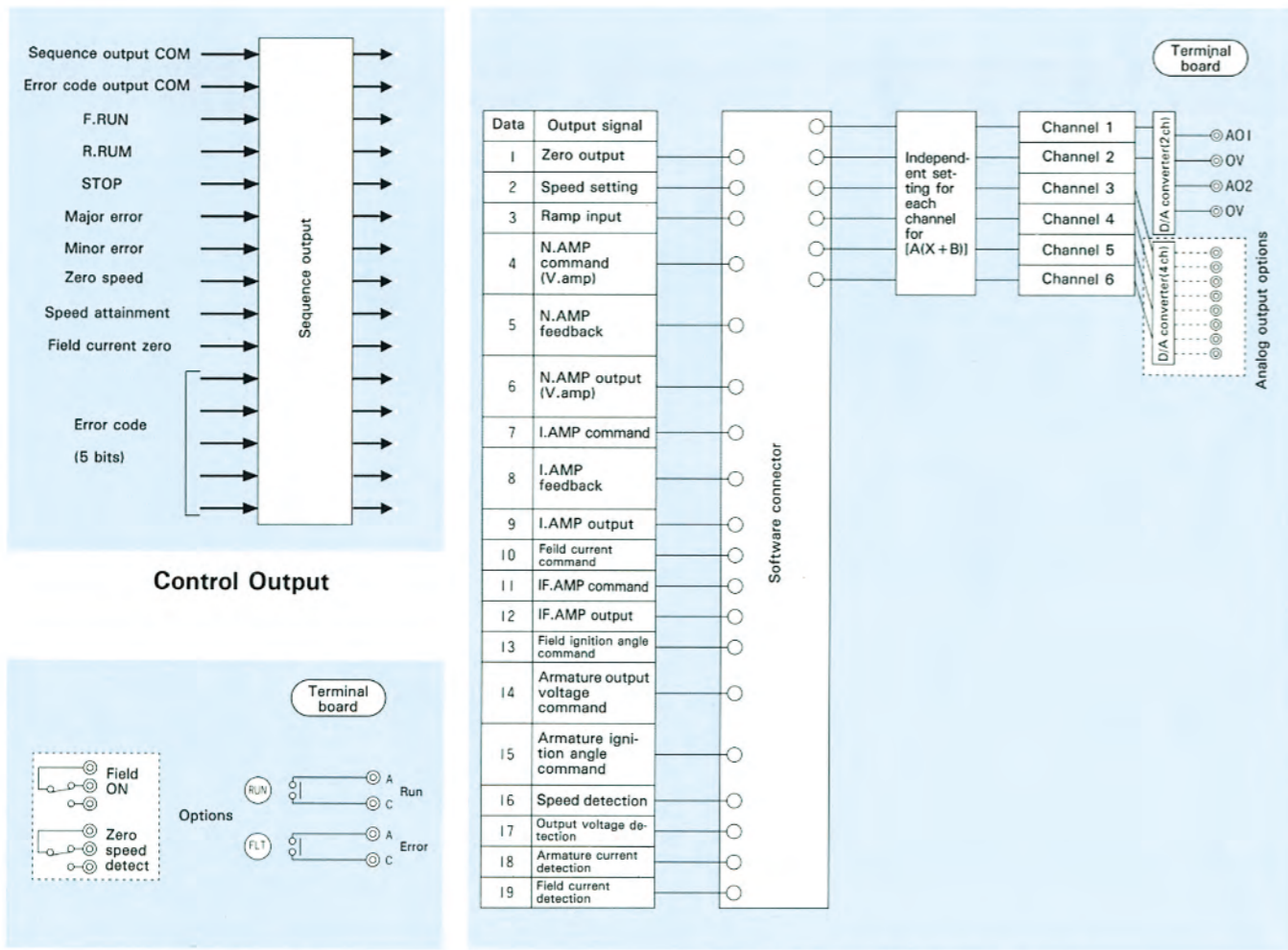


# I/O Specifications



Control inputs and internal commands

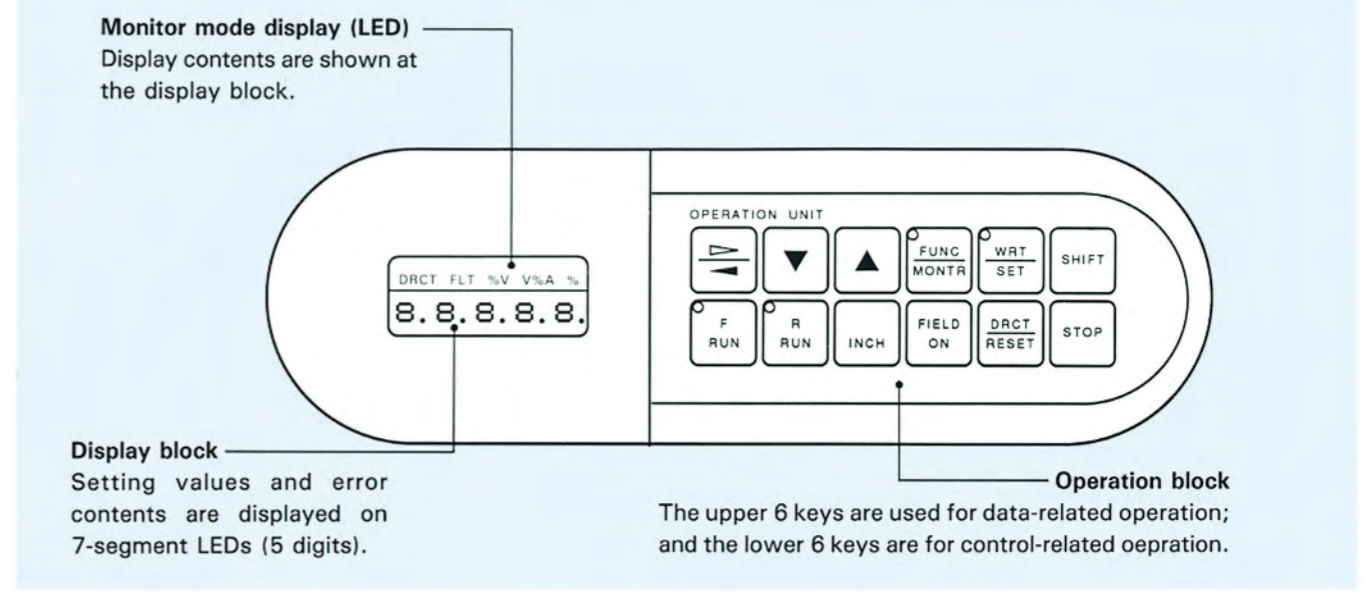
Setting Inputs and Internal Setting



Relay Output

Internal Data and Analog Outputs

# Operation Unit



Operation Block

Monitor Mode Display (LED)

Operation block	Name	Functions
	<b>Cursor moving key</b>	Used to move the cursor. Moved to the left when this key is independently pressed. Moved to the right when the keys [  +  ] are pressed.
	<b>Setting keys</b>	Used to modify data setting. One increment for each press of the key; continuous increment, when key is held pressed for more than one second. One decrement for each press of the key; continuous decrement when key is held pressed for more than one second.
	<b>Forward run key</b>	Used to give a forward run command (effective in local mode). LED is lit during forward operation.
	<b>Reverse run key</b>	Used to give a reverse run command (effective in local mode). LED is lit during reverse operation.
	<b>Inching key</b>	Used to give an inching operation command (effective in local mode).
	<b>Field ON key</b>	Used to give a field ON command (effective in local mode).
	<b>Stop key</b>	Used to give a forward/reverse operation stop command (effective in local mode).
	<b>Shift key</b>	Used in combination with another key. It is pressed when a feature (FUNC, DRCT, etc.) of an upper-stage key is used.
	<b>REMOTE/LOCAL reset key</b>	Used to give a changeover command between remote mode and local mode (with the keys [  +  ]). Also used to make error reset (effective also in remote mode, using the key  independently).
	<b>Function/monitor key</b>	Used for modal changeover between monitor panel setting and "constant" setting. Monitor mode: Output run speed, current, voltage, etc., are displayed. Panel setting mode: Speed-setting values of local setting, inching setting, multi-stage setting, etc., are reviewed and modified. (  key individual LED is lit.) Constant setting mode: Various built-in setting values are reviewed and modified. (  +  keys, LED flickering)
	<b>Write/set key</b>	Data and data numbers are set. While the LED is flickering, the set data are not yet stored in the non-volatile memory. During LED flickering, writing in the non-volatile memory is effected with the  +  keys.

Display (LED)	Functions
<b>FLT</b>	Lit in an error mode.
<b>DRCT</b>	Lit when in local operation mode. While this LED is lit, run, stop, and such operations can be effected from the operation unit.
<b>%V</b>	Data unit display at the display block (% voltage)
<b>%A</b>	Data unit display at the display block (% current)
<b>%</b>	Data unit display at the display block (% speed, etc.)

# Standard Functions of the Unit

## Character-S ramp characteristic (C00, C01, C02, C151, C152, C153)

The setting range is 0.1 to 3600.0 seconds for both acceleration and deceleration. This setting range thus ranges from 0 to maximum speed (C106). In the Character-S operation mode, Character-S time can be set. Character-S time is defined as a time period until attaining the same operation as ordinary ramp performance. Compared with time only for linear ramp, the total ramp time is extended by the amount of Character-S time.

## N-AMP constant changeover (C03 ~ C12)

It is possible to set up two circuit groups for the N-amplifier, in terms of proportional gain, integral time constant, differential time constant, differential input dead zone, and differential output limiter. Changeover to either group is possible by the use of a proper sequence (C171).

## N-AMP limiter changeover (C13 ~ C16)

It is possible to set up two upper-limit and lower-limit limiters for the N-amplifier. Changing over is possible with a sequence (C170). It is also possible to update the limiter values (C147, C148) from the outside.

## Regulation ASR

An ASR with regulation (C146) is available without the use of externally mounted components. It can be switched on and off with a sequence (C161).

## I-AMP constant changeover (C20, C21, C24, C25)

It is possible to set up two circuit groups of proportional constant and integral time constant for the armature current control I-a-amplifier. Changeover to either group is possible with a sequence (C172).

## ASR/ACR/AVR changeover

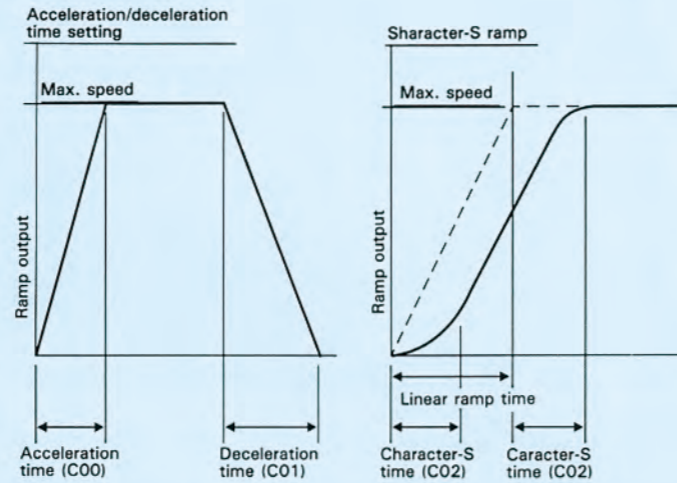
Operation mode can be modified by the use of a control input changeover circuit (C167, C168, C169). When modification to AVR feature is attempted, it is necessary to confirm motor characteristics in advance.

## Error detection

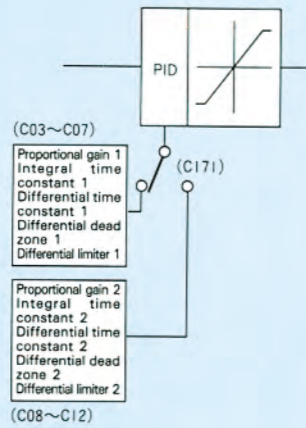
A standard configuration can detect the following errors for protection:

Overvoltage, overcurrent, field overcurrent, loss of field, overspeed, speed sensor malfunction, fuse blow-out, open-phase/reverse-phase detection, and thyristor temperature rise.

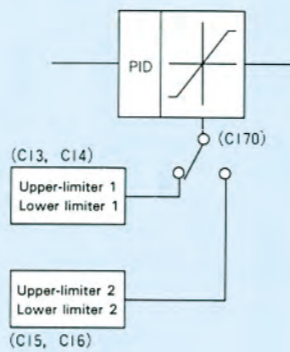
### Character-S ramp



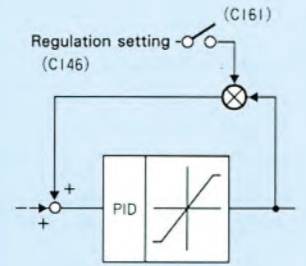
### N-AMP constant changeover



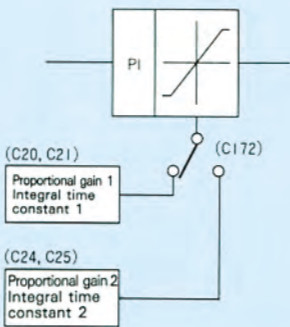
### N-AMP limiter changeover



### Regulation ASR



### I-AMP constant changeover



## Setting input changeover (C140 ~ C154)

Five setting inputs can be chosen from the fifteen setting items (C140 ~ C154). If an optional feature is used, digital setting also becomes possible. (Analog inputs 3 ~ 6; digital setting for optional.)

## Multi-stage setting input

This unit has two sets of 4-stage multi-stage built-in setting features. They can be used by changeover with a sequence (C176 ~ C179).

## Internal data output changeover (C193, C198)

By selection from 18 types of internal data, outputs can be obtained in the 2-channel analog mode. (Channels 3 ~ 6 are optional.)

## Interlocked proportional operation

Interlocked proportional operation is possible by the use of setting input changeover (C140 ~ C154), analog output changeover (C193, C194), analog input gain (C116, C117), offset (C122, C123), upper limiter (C128, C129), and lower limiter (C134, C135).

## Field gain compensation

The unit interior is provided with functions to compensate the loop gain for field control.

## Control input changeover

Sequence inputs for 4 channels and 21 sequential commands are connected in programmable mode. (PS15 ~ PS112 are optional.)

## Sequential functions incorporated

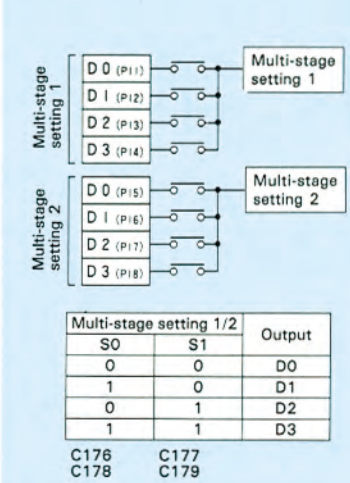
Simplified sequential functions are incorporated. Edge-hold functions for operation commands: External sequence can be eliminated through internal setting for the selection during ordinary operation (free-run stop, ramp stop), inching operation (free-run stop, ramp stop), and emergency stop (free-run stop, ramp stop, regenerative stop).

### Internal data output (with options)

1. Speed setting	ch 1
2. Ramp input	ch 2
3. N-AMP command	ch 3
4. N-AMP feedback	ch 4
5. N-AMP output	ch 5
6. I-AMP command	ch 6
7. I-AMP feedback	
8. I-AMP output	
9. Field current setting	
10. Field I-AMP command	
11. Field I-AMP output	
12. Field ignition angle command	
13. Armature output voltage command	
14. Armature ignition angle command	
15. Speed detection	
16. Output voltage detection	
17. Armature current detection	
18. Field current detection	

(C193, C198)

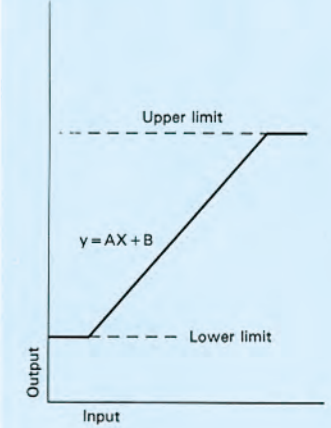
### Multi-stage setting input



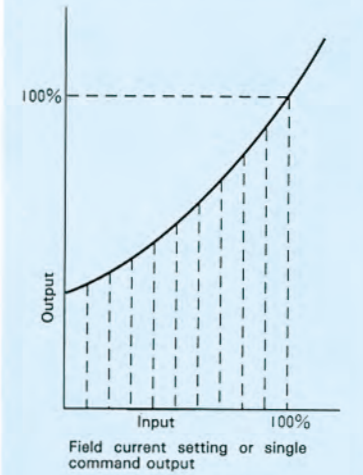
### Setting input (with options)

Internal data	Speed setting 1
Multi-stage setting 1	Speed setting 2
Multi-stage setting 2	DC voltage setting
Analog input 1	Armature current setting
Analog input 2	ΔN setting
Analog input 3	Draw setting
Analog input 4	Regulation setting
Analog input 5	N-AMP lower limiter
Analog input 6	N-AMP upper limiter
Digital setting	Field current setting
	Ramp acceleration time
	Ramp deceleration time
	Character-S time
	Current bias setting
	Various settings (C140 ~ C154)

### Interlocked proportional operation



### Field gain compensation



### Control input (with options)

OFF	Inching 1
PS11	Inching 2
PS12	Field ON
PS13	Control trip release
PS14	Ramp bus
PS15	ΔN ON
PS16	Regulation ON
PS17	Voltage feedback
PS18	ASR operation
PS19	AVR operation
PS110	ACR operation
PS111	N-AMP limiter changeover
PS112	N-AMP gain changeover
F.RUN	I-AMP gain changeover
R.RUN	Speed setting 1/2
STOP	External feedback ON
ON	Multi-stage setting 1 S0
	Multi-stage setting 1 S2
	Multi-stage setting 2 S0
	Multi-stage setting 2 S1
	Emergency stop

(C155 ~ C180)

## Optional Functions

### ● Relay I/O option

This option adds eight input channels (PSI1 ~ PSI12) for control input changeover and two relay output channels. The extension input channels function as a programmable sequence input. The extension relay output channels are used as C-contact outputs for "FIELD ON" and "ZERO SPEED."

### ● High-accuracy AVR option

This option is used for high-accuracy AVR control (control range of 50 : 1 and control accuracy of  $\pm 1.0\%$ ).

### ● Parallel input option

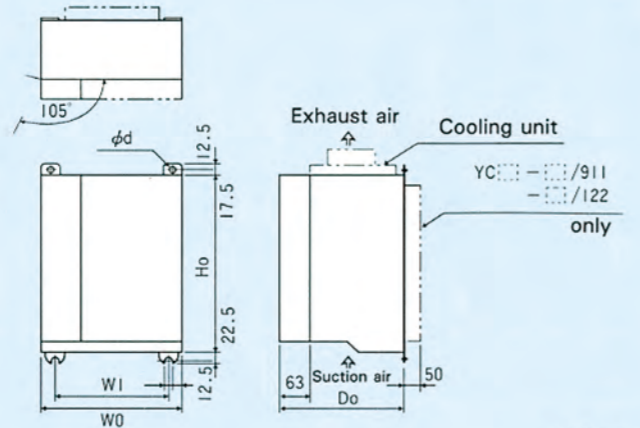
This option secures digital setting input during setting input changeover. Setting is possible in a mode of 16-bit binary, 16-bit BCD, 8-bit binary, etc.

### ● Analog I/O option

This option provides for additional 4 channels of analog input for setting input changeover and another additional 4 channels of analog output for internal data output performance.

## External Dimensions of the Unit

Dimensions (mm)								
Type	W <sub>0</sub>	W <sub>1</sub>	D <sub>0</sub>	H <sub>0</sub>	a	d	Cooling unit	Approx. mass (kg)
YC □-□/250	330	300	263	635	7	7	Not provided	28.5
YC □-□/450	330	300	263	635	7	7	Not provided	28.5
YC □-□/101	330	300	263	635	7	7	Provided	30
YC □-□/121	330	300	263	635	7	7	Provided	30
YC □-□/231	330	290	334	810	9.5	9.5	Provided	56
YC □-□/351	365	325	334	810	9.5	9.5	Provided	60
YC □-□/501	365	325	334	810	9.5	9.5	Provided	60
YC □-□/701	395	350	384	910	9.5	9.5	Not provided	70
YC □-□/911	365	325	334	1310	9.5	9.5	Not provided	110
YC □-□/122	395	350	384	1535	9.5	9.5	Not provided	130



Unit:mm

\* Note: For the YC □-□ /701, 911, and 122 units, a cooling fan is mounted on the standard control panel.

## Motor-Driven Blower Specifications

### For unit cooling

Unit type	Cooling unit provisions	Blower motor	
		Output(W)	Power supply
YC □-221/250	Provided	Not provided (Self-cooled type)	
YC □-221/450		Not provided (Self-cooled type)	
YC □-221/101		20W	Single-phase 200/220V, 50/60Hz
YC □-221/121		45W × 2	
YC □-221/231			
YC □-221/351	100W	3-phase 200/220V, 50/60Hz	
YC □-221/501			
YC □-221/701	Not provided (mounted on standard control panel)	100W	3-phase 200/220V, 50/60Hz
YC □-221/911		200W	
YC □-221/122			
YC □-441/250	Provided	Not provided (Self-cooled type)	
YC □-441/450		Not provided (Self-cooled type)	
YC □-441/101		20W	Single-phase 200/220V, 50/60Hz
YC □-441/121		45W × 2	
YC □-441/231			
YC □-441/351	100W	3-phase 200/220V, 50/60Hz	
YC □-441/501			
YC □-441/701	Not provided (mounted on standard control panel)	100W	3-phase 200/220V, 50/60Hz
YC □-441/911		200W	
YC □-441/122			

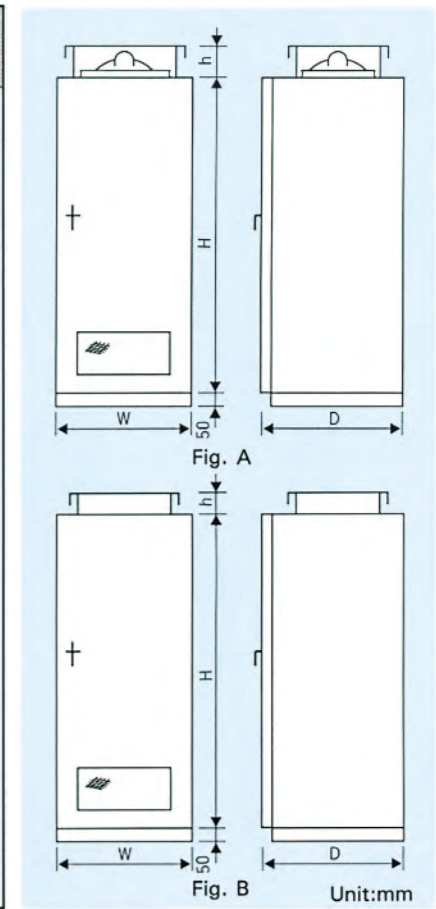
### For DC machine cooling

Frame No.	Blower motor	
	Output (kW)	Power supply
100S 100L	0.11	Single-phase 200/220V, 50/60Hz
112M 112L	0.16	
132S 132M 132L	0.4	3-phase 200/220V, 50/60Hz or 400/440V, 50/60Hz
160S 160M 160L	0.75	
160B 160C		
180B 180C	1.5	
200B 200C		
225B 225C 225D	2.2	
250A 250B 250C 250D		
280B 280C 280D	3.7	
315B 315C 315D 315E	5.5	

## External Dimensions of Standard Control Panel

These are example dimensions of a panel incorporating Meidensha's standard DC motor driving sequences and a THYL-300C unit. When an option is added, these dimensions may be modified.

Voltage (V)	Motor (kW)	Exterior view	W (mm)	D (mm)	H (mm)	h (mm)	Approx. mass (kg)	Application					
220	3.7	Fig. B	700	800	1900	100	300	Motor applications are for Class A type (100% continuous, 150% for 1 minute).					
	5.5												
	7.5												
	11												
	15												
	18.5												
	22												
30													
37	Fig. A	800	800	1900	100	400							
45													
55	440	Fig. B	700	800	1900	100							
75													
90							Fig. A		800	800	2300	300	550
110													
132							900	800	2300	300	700		
160													
200							1000	800	2300	300	850		
250													
315													
400													



Unit:mm



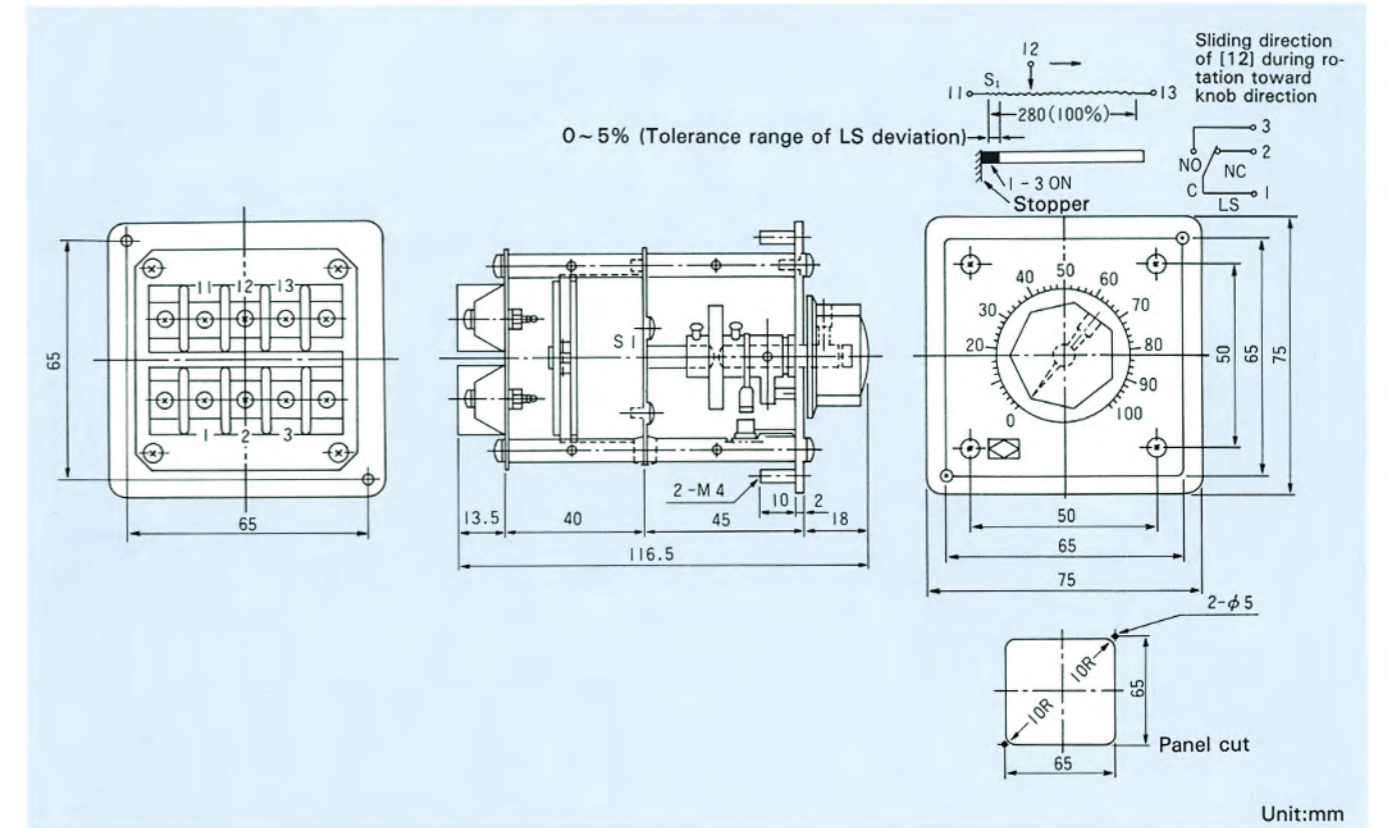
## Motor Applications

Rated output (kW)	Base speed (min <sup>-1</sup> )										Rated voltage (V)	
	2500		1750		1450		1150		850			
	Frame No.	Max. speed	Frame No.	Max. speed	Frame No.	Max. speed	Frame No.	Max. speed	Frame No.	Max. speed		
3.7	I12M	3700	I12L	3000	I32S	2900	I32M	2800	I32L	2600	220	GF-70 Series
5.5	I12L	3500	I32M	3000	I32M	2800	I32L	2800	I60S	2600	220	
7.5	I32M	3500	I32L	3000	I32L	2800	I60S	2800	I60L1	2500	220	
11	I60S	3300	I60S	3000	I60M	2800	I60L1	2600	I60B1	2200	220	GF-80 Series
			I60M	2500	I60L1	2000	I60B1	2300	I60C1	1700	440	
15	I60S	3300	I60M	3000	I60L1	2800	I60L1	2600	I60B1	2200	220	
			I60L1	2100	I60B1	2000	I60B1	2000	I60C1	1500	440	
18.5	I60M	3100	I60L1	3000	I60L1	2800	I60B2	2000	I60C2	1700	220	
			I60L1	1750	I60B1	2000	I60C1	1150	I80B1	1500	440	
22	I60L2	3100	I60L2	3000	I60B2	2600	I60C2	2400	I80B2	1800	220	
			I60B1	2400	I60C1	2000	I80B1	2400	I200B1	2000	440	
30			I60B3	2600	I60C3	2600	I80B3	2400	I80C3	2200	220	
			I60B1	2400	I80B1	1900	I80C1	1700	I200C1	1900	440	
37			I60C3	2600	I60C3	2600	I80B3	2400	I80C3	2200	220	
			I80B2	2200	I80B2	1800	I200C1	2200	I200C1	1500	440	
45			I80B3	2400	I80B3	2200	I80C3	2200	I200C2	2000	220	
			I80C2	2400	I80C2	2200	I225B1	2200	I225B1	2000	440	
55			I200B3	2200	I200B3	2200	I200B3	2200	I200C3	2000	220	
			I200B1	2200	I200B1	2000	I225B1	2200	I225C1	2000	440	
75			I200B3	2200	I200C3	2100	I200C3	2000	I225C2	2000	220	
			I200B2	2200	I200C2	2100	I225B1	2200	I225C1	2000	440	
90			I200C3	2000	I200C3	2000	I225B2	2000	I225D2	2000	220	
			I200C2	2000	I225B1	2200	I225C1	2000	I225D2	1800	440	
110			I200C2	2000	I225B2	2000	I225C2	2000	I250C2	1800	440	GF-100 Series
132			I225B2	2000	I225C2	2000	I225D2	2000	I250C2	1700	440	
160			I225C2	2000	I225D2	2000	I250C2	2000	I250D2	1700	440	
200			I250B3	2000	I250C3	1900	I250D3	1700	I280D2	1600	440	
250			I250C3	1900	I250D3	1800	I280C3	1700	I315C3	1500	440	
315			I280B3	1900	I280C3	1800	I280D3	1500	I315D3	1500	440	
400			I315B4	1900	I315B4	1900	I315C4	1500	I315E4	1300	440	

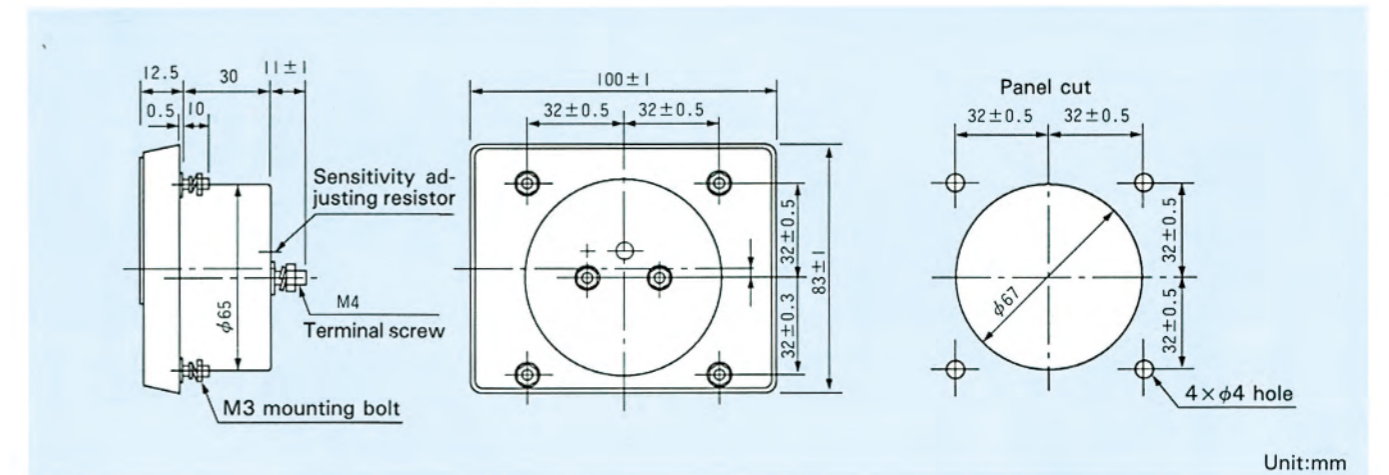
- Notes: 1. The base speed is a rated revolving speed for standard specifications (voltage control).  
 2. Maximum speed is a maximum value available under field control while the armature voltage is set at a rated value.  
 3. Please consult Meidensha Corporation, since DC reactors may be required for a certain revolving speed being adopted.  
 4. Consult Meidensha Corporation for belt driving, since frame-number application may be changed according to belt specifications.  
 5. Consult Meidensha Corporation for occasions, since 440V units with capacities of 7.5kW or below can also be manufactured.

## Recommended Items

### Manual speed setter (Type: YRHM-J03111)



### Tachometer, Ammeter (Type: DCF-10V)







## MEIDENSHA CORPORATION

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