NACHI

Standard Specifications

CFD Controller

First Edition

NACHI-FUJIKOSHI CORP.

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1. Basic Specification

Item	*Specification*
Controlled axis	Simultaneous 6 axes (maximum 7 axes as option)
Servo motor	AC servo motor
Position reader	Absolute encoder
Programming language	Teaching playback
Program number	9,999 programs
Memory capacity	256MB (2,560,000 steps equivalent)
Teach pedant	High-performance TP 3 position enable switch, Emergency stop button 5.7 inches color LCD (640*480 graphic display)、touch panel Insertion port is equipped standard cable length 4m, IP65 equivalent protection (exclude connector)
	Mini TP 3 position enable switch, Emergency stop button Monochrome, 20 letters×4 lines Character display (English, Numbers, Kana)） Standard cable length 4m, IP54 equivalent protection (exclude connector)
Operating switch	Mode select switch (teach/playback), Emergency stop button
Safety function	PLd (Support category 3)
Cables to robot	Standard cable length 2m
Memory device	Flash memory
External memory device	USB memory (USB memory itself is not accessory of controller)
Expansion slot	PCI 2slot
Protection	IP 20 equivalent
Primary power supply	3-Phase AC200～230V±10%, 50/60Hz, D grounding Single-Phase AC200～230V±10%, 50/60Hz, D grounding
Consuming power	0.4KVA
Ambient temperature	0～40ºC (50/60Hz)
Ambient humidity	20～85% (no dew)
Installation	Not higher than 1,000 meters above sea level
External dimension	W369×D490×H173
Weigh	Approx.17Kg

2. Control Specification

2.1 Standard functions

Functions	*Abstract*
Robot Language	Record, Playback for operation program with SLIM language.
Linear interpolation	Linear interpolation movement; XYZ parallel movement on robot coordinate system Fixing TCP movement; changing robot attitude fixing TCP point Tool coordinate movement; XYZ parallel movement on tool coordinate system (coordinate system is based on the world wide standard JIS B8437)
Circular interpolation	Circular movement on 3 dimensional space by designating min. 3 points. Start point and end point can be designated individually.
Low speed playback	TCP speed is limited 250mm/sec under following condition. 1. Low speed signal input 2. Check GO/BACK operation First step playback after STEP number is designated.
Speed definition	TCP linear speed 1 - 5000mm/sec (0.1mm/sec unit) Time 0.01 - 100sec (0.01sec unit) Power ratio 1.0 - 100.0% (0.1% unit) Tool angle speed 1 - 500deg/s (1deg/s unit)
Speed override	Playback speed can be varied 1 - 150% without changing recorded speed.
Check GO/BACK	In teach mode, recorded position can be confirmed step by step or continuously, and forward/backward. (Functions also can be played back.)
Accuracy	8 degrees (0 - 1000mm) of in position accuracy can be designated on every step. And in-position or path-through can be designated also.
Tool designation	32 different tools can be designated on every step.
Automatic tool length calculator	Tool length is calculated by playback designated program.
Automatic tool weight and COG calculator	Tool weight and COG is calculated by playback designated program.
Automatic tool moment of inertia calculator	Tool moment of inertia is calculated by playback designated program.
Self checking	Self check the error of robot and controller. (700 kind of errors)
Error detection	Check the condition of robot and controller all the time. Robot stops immediately when error happens.
Logical I/O	Maximum 2,048 logical inputs and 2,048 logical outputs are available as standard.
Signal assignment	Port assignment and positive/negative logic of all I/O is available.
Editor	1. Screen editor Addition, deletion and copy of every move step and function is available. Recorded position can be also edited. 2. Copy utility Recorded program and step can be copied. 3. Program conversion Condition & speed, each axis angle, parallel shift, etc. 4. Program Certification File directory, file verify

Functions	*Abstract*
Machine lock	This can check I/O by playback program, keeping robot stationary.
I/O simulation	This can check program flow by changing logical I/O from teach pendant, keeping physical I/O locked.
Memory protect	This can protect program to avoid the modification and deletion by careless operation.
Power saver	This can save energy by turning the motor power off and brake lock after pre-determined time passed with no movement. When more time passed, fan motors inside of cabinet will stop for further power saving.
Monitor utility	Real time monitor of following data; 1. Robot program 2. Error logging 3. Fixed I/O 4. General usage I/O 5. Program queue 6. Operating time 7. PLC program (ladder monitor), and or so
Help message (Built-in manual)	Operations and function explanations are displayed on teach pendant. And graphical troubleshooting manual is also displayed.
Customization	Software keys are re-locatable for better operation.
Power failure backup	When main power is down while playback robot, all necessary data is back upped for easy restarting of the robot after power is turned on.
Program queue	Up to 10 programs to be played back can be reserved.
Home position	Up to 32 home positions can be defined. Home position signal is outputted.
Functions	- General usage signal output - General usage signal input - Program flow control (step jump/call, program jump/call) - Timer delay - Welding, and or so
Interface panel	Pushbuttons and lamps can be arranged on teach pendant touch panel screen. Operating switches and indicators are replaced to software, so this utility can contribute to cost down. Available to register up to 31 keys /screen * 8 screens = 248 keys
Ethernet	File upload and download via Ethernet is available. (1 port)
Built-in PLC	This is software programmable logic controller. Physical I/O board (another option) is necessary to perform I/O actually. (Refer to hardware option)
High Speed Interference Detection	In the case operation mistake or unexpected interference occurs during teaching work, this function can detect it as a contact with outside world, and stops the robot immediately.
Overhaul Prediction	This is to prevent occurrence of trouble by estimating the lifespan of bearings in each robot arm and by detecting torque overage. Furthermore, this function can predict the overhaul timing of the robot.

2.2 Option functions

【Hardware option】

No.	Item	Specification
■ Memory		
1	USB memory	Used to backup program and constant. (1GB USB memory) (Insertion port is equipped as standard on the controller.)
■ Interface		
1	Fieldbus	Fieldbus is available with up to 4 channels with the combination of master, slave and master+slave. (Maximum channel quantity may vary according to Fieldbus specification and combination with other options.) CC-Link Ethernet IP DeviceNet Profinet Profibus
2	Multiplied I/O (Input 8 NPN Spec.)	Input 8 DC24V(no pole, input resistance 3KΩ／8mA) Output 8 DC24V(NPN, output voltage DC36V output current 100mA)
3	Multiplied I/O (Input8 Relay output)	Input 8 DC24V(no pole, input resistance 3KΩ／8mA) Output 8 DC24V(Relay contact, output voltage DC30V output current 500mA)
4	Multiplied I/O (Input 32 NPN Spec.	Input 32 DC24V(no pole, input resistance 3KΩ／8mA) Output 32 DC24V(NPN, output voltage DC36V output current 100mA) Maximum Input 64point, Output 64point with additional two PCB
5	Multiplied I/O (Input 32 PNP Spec.)	Input 32 DC24V(no pole, input resistance 3KΩ／8mA) Output 32 DC24V(PNP, output voltage DC36V output current 100mA) Maximum Input 64point, Output 64point with additional two PCB
■ Cable		
1	TP Cable Length	TP cable can be extended with relay extension 5m, 10m
2	TP Short Circuit Connector	Plug the cable into connector instead of TP for operation without TP (short circuit TP E-stop signal)
3	Robot Cable	Motor/Encoder cable between controller and robot 2m (standard), 5m, 10m, 15m, 20m
4	Robot Cable (Relay Extension)	Extension of motor/encoder cable between controller and robot with relay 5m, 10m, 15m (Maximum cable extension is 25m (total length with robot cable + relay)
5	I/O cable	I/O signal cable between controller and robot 2.5m, 5.5m, 10.5m, 15.5m, 20.5m

Others		
1	Brake release SW	Portable brake release switch.
2	IP54 Compliance (*1)	Provided dust/water proof box and IP54 controller protection
3	Vision Sensor Unit (*1)	Additional Vision Sensor unit in order to calculate the work (object) position that was taken by camera.
4	Force Sensor I/F	Additional I/F board for analog signal input/output.
5	Conveyor synchronization	To perform conveyor synchronized motion, speed signal receiver board is added. Specification of receiver board: Differential input (conforming to RS-422), Terminating register 100Ω (can be set by SW on board) Response frequency 1MHz max
6	Robot Monitoring Unit (*1)	A Robot Monitoring Unit that monitors the robot position and the robot speed is added.
7	For North America	Some parts are replaced to conform to North America standard ANSI/RIA R15.06:1999 and NFPA79
8	For Europe	Some parts are replaced to conform to European standard: CE marking.

Note: (*1) Controller view will be different from a standard one due to proving the dust/water proof box.

【PC Tool】

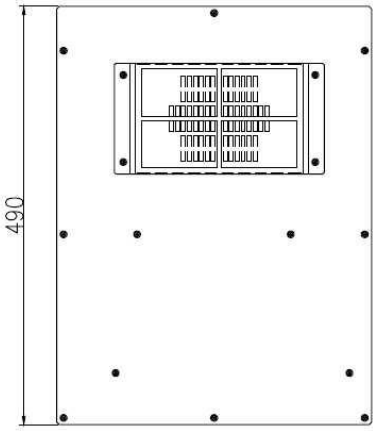
No.	Item	Specification
1	FDonDesk	Advanced programming and configuration changes for CFD controller are possible by this software. Data upload/download is also possible by connecting PC and CFD controller via Ethernet. The following grades are available: Light: All CFD functions including cycle time verification can be used Pro: Program playback & multi-robots functions (optional) are available by adding “Pro” to Regular.

【Document】

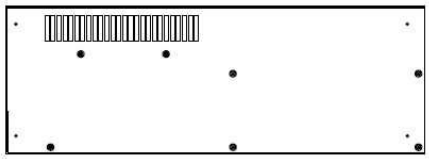
No.	Item	Specification
1	Instruction manual	Document explaining the basic operation and setup operation. Please select either a paper manual or a CD manual.

3. Controller Appearance

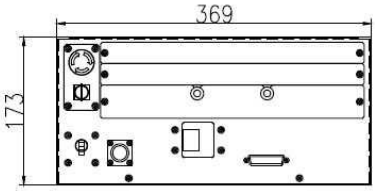
3.1 Controller Dimensions



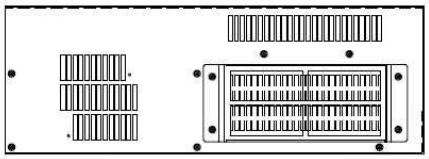
Top View



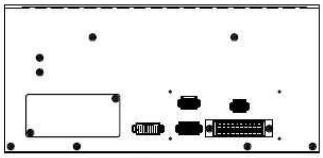
Left Surface View



Front View



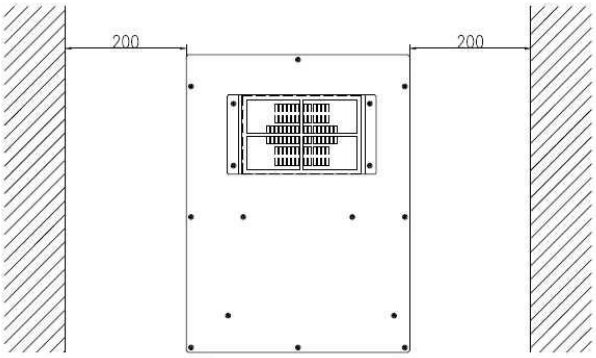
Right Surface View



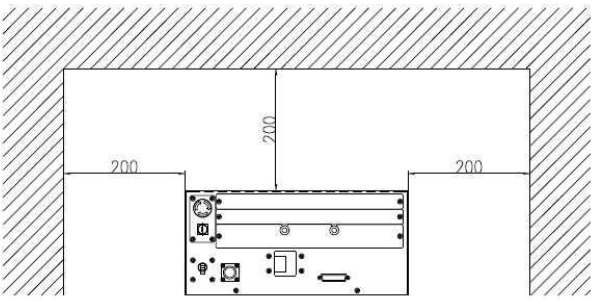
Rear View

4. Installation

When installing the controller, leave a clearance of at least 200 mm between the controller and the wall behind it in order to ensure proper ventilation inside the robot controller. The CFD controller is not dust/water-proof. An additional IP54 (optional) is required for dust, humid environment.



Top View



Front View