SMACH
Smart Technology

To eco-drive era of the motor

SMACH turns smart in any motor.

Universal Inverter Driver

SMACH
Technology

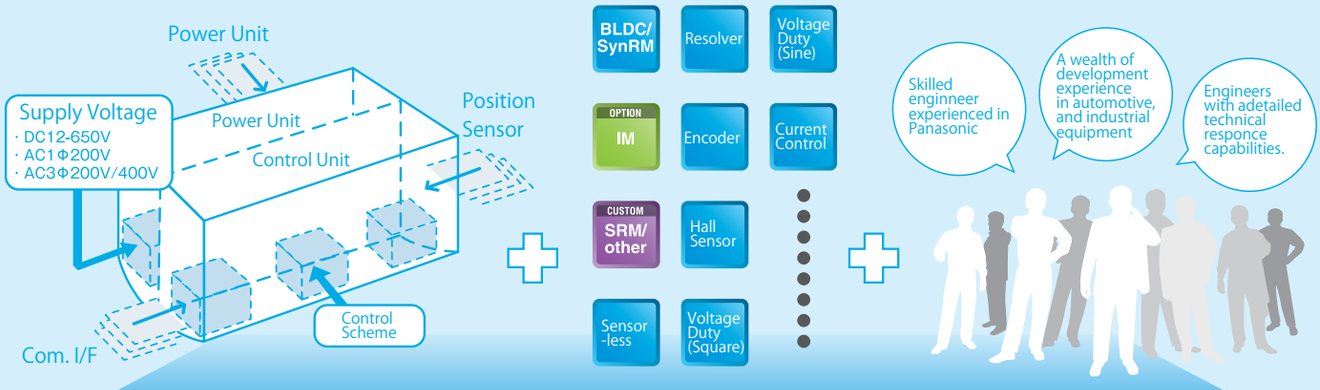
SMACH CO,.Ltd.

Packed with SMACH's technologies!
Motor Driver that "CAN" drive variety of motors

"Universal Inverter Driver" is a motor driver of new ideas packed with SMACH's technologies.
Customizable configurations have made it possible to drive a variety of motors. With short delivery time and low cost, SMACH can provide a motor driver that meets each customer's needs.
For customization, SMACH's technical coordinators will provide finely tuned support services for even advanced development requests. With detailed parameter settings, SMACH has received high reputation from the professionals of motor driving technologies.

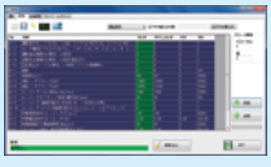
With the customizable configurations, a variety of motors "CAN" be driven.

(Customizable configurations) (Variety of functional units) (Exellent technology coordinator of SMACH)



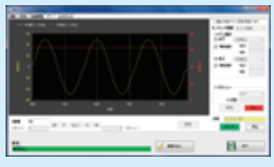
Variety of motors be driven for a low development cost and short delivery time

Engineers with little experience in motor driving technologies "CAN" use S2C (GUI operation software)

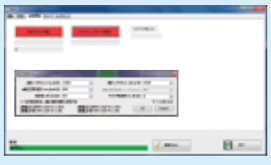


■ Parameter setting screen
Set motor parameters, various controller gains, various control value modulation methods, and career frequency, etc.

■ Drive control screen
Select drive method and command method, control current and advance angle, and monitor speed, motor current, etc.



■ Drive status screen
Display various operation status such as voltage, current, speed, etc., and time chart.



■ Auto tuning screen
Automatically measure the electric constant of a motor and offset position of a position sensor.

■ Analog output setting screen
Set range for analog output such as current.

■ Map setting screen
Set maximum torque control and field weakening control.

Specifications of PC Software "S2C"

- Set sensor parameters (such as encoder pulse count), set motor parameter (such as number of poles, R, L, φs), set various limit levels (such as current, voltage, number of rotations), switch control methods (such as current vector control), switch command methods (such as current command, number of rotation command, and duty command), and set advance angle values.
- The PC software "S2C" communicates with an inverter through RS-232C. The communications can be customized to meet customer's needs.
- The optional operation board can be selected instead of the "S2C" Inverter parallel operation using CAN or RS-485 or RS-422 is also available.

Customizable functional units "CAN" expand drive fields

SMACH
Smart Technology
To eco-drive era of the motor

Motor Compatibility

- **BLDC/ SynRM** — Brushless DC motor, Synchronous reluctance motor (w/ or w/o sensor)
- **OPTION IM** — Induction motor (One inverter for synchronized motor and induction motor, thus higher facility efficiency)
- **CUSTOM SRM/ other** — Special motors can be driven with customized inverters.

drive method

- **Voltage Duty (square wave)** — Square wave output to a motor. Characteristics can be compared to other driving methods.
- **Sine Wave** — Sine wave output to a motor. Characteristics can be compared to other driving methods.
- **Current Control** — Current output to a motor with commanded amplitude. Characteristics can be compared to other driving methods.
- **Speed Control current minor** — Feedback control of output current to a motor based on speed command.
- **Speed Control voltage minor** — Feedback control of output voltage to motor based on speed command.
- **Position Control** — Output to motor is controlled so that stopping position can be where commanded.
- **Torque command Control** — Feedback control of output current to motor based on torque command.

Sensors

- **Sensor-less** — Extended induced voltage method for estimating rotor position and driving a motor.
- **Resolver** — Highly reliable resolver is used for position sensor
- **Encoder** — Highly precise encoder is used for position sensor
- **Hall Sensor** — Hall sensor with high cost performance is used for position sensor

Control I/F

- **Serial communication RS-232C** — Control and monitor motor and inverter from PC through the special GUI through RS232C serial communication.
- **OPTION Serial communication RS-422/485** — Control and monitor motor and inverter through RS422/485 serial communication.
- **OPTION Serial communication CAN** — Control and monitor motor and inverter through CAN communication.
- **OPTION Digital/ Analog I/O** — Control and monitor motor and inverter through digital/analog input/output.
- **CUSTOM Other communication** — Other communication method may be used as requested

Operation Conditions

- **wide input voltage line-up** — Motor driver' s input rated voltage ranges from 12V to 650V
- **wide output current line-up** — Motor driver' s maximum output current ranges from 25A to 650A
- **CUSTOM Water & dust resistance** — Operation is guaranteed in an environment where water and dust dance
- **CUSTOM AC input** — Motors can be driven with commercial alternating current supply.

Additional Functions

- **Third harmonic super-position** — To increase the maximum operating speed of the motor by increasing the power utilization. Characteristics can be compared with other modulation methods.
- **2-pahase modula-tion** — To improve inverters efficiency by reducing switching losses while increasing the power utilization
- **OPTION Dead time compen-sation** — To drive motor with dead time for preventing the upper and lower short circuit of switching elements in consideration.
- **OPTION Overmod-ulation, 1 pulse control** — To further increase the maximum operation speed by increasing power utilization to its maximum level
- **Decoupling control** — To improve controliability by offsetting interference at the time of the current control of D axis and Q axis
- **OPTION Torque pulsating restriction control** — To control cogging torque's pulsation at the time of low speed for smooth motor rotation

Additional Functions

- **Carrier frequen-cy swing** — To reduce noise by dispersing switching carrier frequency
- **Dynamic carrier frequen-cy swing** — To optimize efficiency and controllability by changing carrier frequency in accordance with motor rotation speed.
- **position sensor offset adjustment** — To automatically adjust the offset position of position sensor
- **OPTION Terque control** — To reduce vibration by applying feed-forward control to torque fluctuation.
- **MAP drive function** — To optimize operation by automatically changing various control parameters.
- **Pattern drive function** — To drive motor with a pattern of operation set up beforehand
- **Control gain auto adjustment** — To automatically set optimal control gain when a cutoff frequency is put in
- **Electric constant off-line identifi-cation** — To automatically measure electronic constants needed for determining sensorless drive and speed control gain
- **OPTION Induction voltage identifi-cation** — To automatically measure motor induction voltage constants

Additional Functions

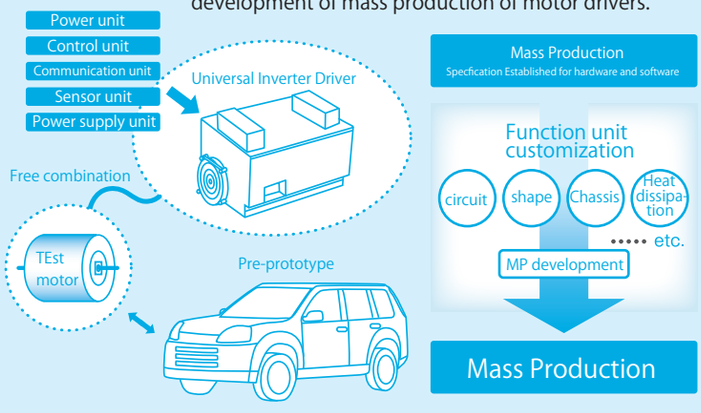
- **Sensorless control gain automatic adjustment** — Automatically calculate sensorless control gain based on an input constant or an off-line identification results.
- **OPTION identifi-cation of electric condtant** — To measure various settings that change depending on operation conditions while driving motors
- **OPTION Highly efficient preMAP** — To map optimal operation points beforehand based on various settings that change depending on operation conditions
- **OPTION Brake resistance** — To shorten the control time taken for motor to stop by having energy consumed with resistance at the time of motor braking
- **OPTION Regeneta-ting brake** — To shorten the control time taken for a motor to stop by regenerating the energy of a motor to DC power supply
- **OPTION Motor output relay off when stopped** — To reduce failure due to overvoltage by preventing regeneration of energy to DC bus side at the time of motor braking
- **Chart function** — To display major variables/parameters on a chart with GUI "S2C.'
- **Monitor function** — To check inverter status by GUI "S2C."
- **GUI with easy operation** — To control motor with a sense of direct operation through GUI "S2C."

SMACH's flexible technical capabilities "CAN" satisfy new custom needs evolving with time and trend

Universal Inverter Driver "CAN" be used as:

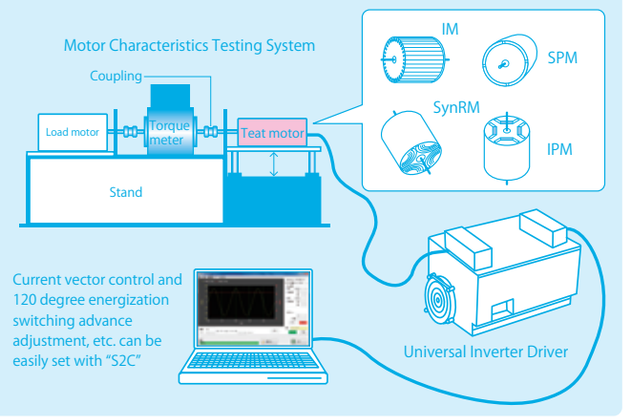
1 Pre-prototype driver for mass production development

Customizable functionality units of Universal Inverter Driver help reduce costs and delivery time for development of mass production of motor drivers.

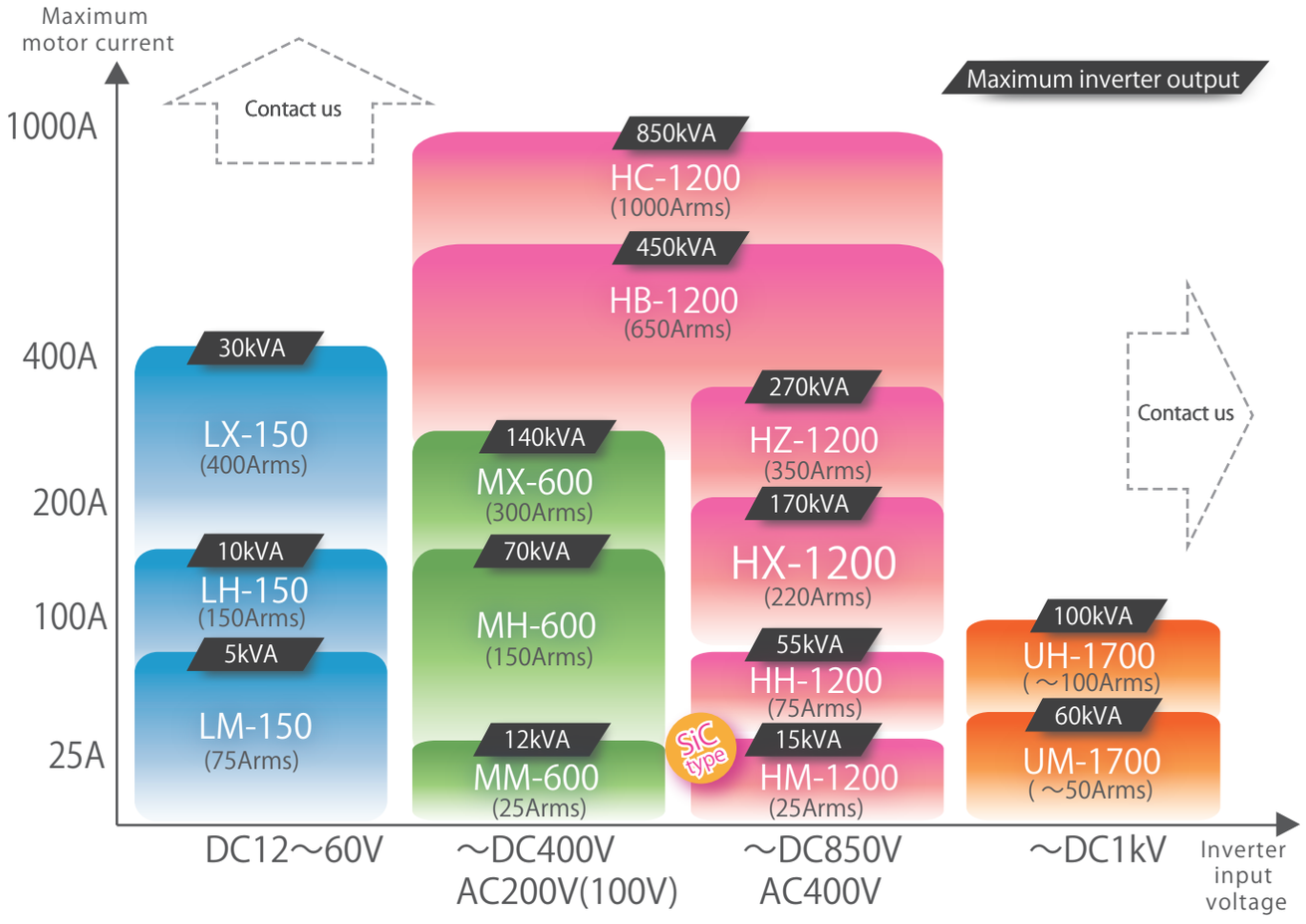


2 Driver for special motors in research and development phases

Variety of motors in research and development phases can be driven with customized functional units.



Specifications of Universal Inverter Drivers



Specifications

Body series	L-series			M-series			H-series						U-series	
Model name	LM-150	LH-150	LX-150	MM-600	MH-600	MX-600	HM-1200	HH-1200	HX-1200	HZ-1200	HB-1200	HC-1200	UM-1700	UH-1700
Power-supply voltage	DC12～60 V			DC100～400 V			DC200～850 V						DC1000 V	
Maximum motor current	75 A	150 A	400 A	25 A	150 A	300 A	25 A	75 A	220 A	350 A	650 A	1000 A	50 A	100 A
Cooling method	Forced air cooling			Forced air cooling			Forced air cooling			Water cooling			Forced air cooling	

● Adopted for automotive factory production Line. ● Obtained CE marking. We support export to overseas.

Inverter Driving System	・Current vector control ・voltage control (square wave, sine wave) *Regardless of whether with sensor or without sensor.	Driving Motor	Permanent Magnet Synchronous Motor(IPM, SPM) , SynRM, SRM, Induction motor and various other motors
Communi-cation Function	RS232C, RS422, RS485, CAN, Ethernet(HC)	Rotor Position Detection Sensor input	・Resolver ・Encoder ・Hall Sensor
	Analog directive		
Protective Function	Installed standard		

※Specifications, etc. are subject to change without notice.

SMACH CO., Ltd.

Head Office 2-1-61 Shiromi, Chuoh-ku, Osaka City, Osaka 540-6114, Japan

Development Center 18-8 Kinoshita-cho, Otsu City, Shiga 520-0812, Japan
TEL : +81-77-526-8815 FAX : +81-77-526-8816

Evaluation Center 7-3-46 Nojihigashi, Kusatsu City, Shiga 525-0058, Japan
TEL : +81-77-569-5884

URL https://smach.jp/ E-Mail customer1@smach.jp