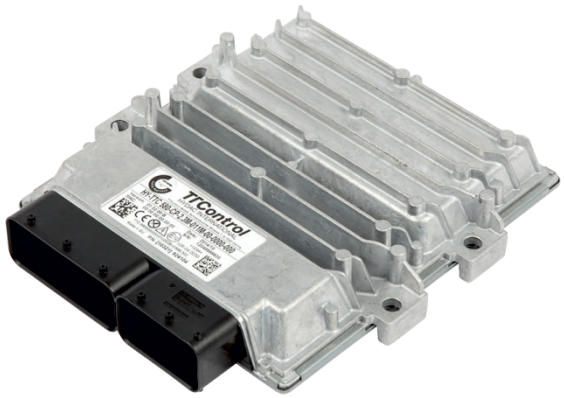
TTControl
HYDAC INTERNATIONAL

HY-TTC 500 Family

Freely Programmable High-End Off-Highway Control Units



Key Benefits

- High Performance: 32-bit dual-core lockstep CPU with 180 MHz and floating-point unit, 12-bit ADCs
- Extensive I/O set with multiple software configuration options per pin
- Open programming environment C (extended with SAFERTOS® integration), CODESYS® V3.x and CODESYS® V3.x Safety SIL 2
- IEC 61508 (SIL 2), EN ISO 13849 (PL d), ISO 25119 (AgPL d) and ISO 26262 (ASIL C) TÜV certified
- Connectivity: up to 7 CAN interfaces
- Ethernet / BroadR-Reach®
- Up to 2.3 MB RAM / 32 MB Flash

The HY-TTC 500 product family is a high-end electronic control solution. The controller with its powerful TMS570 dual-core lockstep CPU is designed for use in demanding safety-relevant mobile machinery applications. The five product variants HY-TTC 590, HY-TTC 580, HY-TTC 540, HY-TTC 510 and HY-TTC 508 fulfill safety requirements up to SIL 2 (IEC 61508), PL d (EN ISO 13849), AgPL d (ISO 25119) and ASIL C (ISO 26262). They are part of a complete and compatible product family and can be programmed either in C, CODESYS® Safety SIL 2 or in SAFERTOS® environment.

Flexibility and Usability

The extensive I/O set with various configuration options makes the HY-TTC 500 controllers suitable for a wide range of high-end applications: For example, a group of 8 I/O pins can be individually configured for use as PVG output, voltage output, digital output or analog input.

Commissioning time can be improved by using Ethernet for download and debugging purposes.

Safety

A high percentage of the run-time tests that are needed to achieve the diagnostic coverage required for SIL 2 / PL d is performed in hardware by the dual-core lockstep CPU and its safety companion.

This keeps much more processing power available for the application in comparison with solutions that implement the safety measures in software.

The available memory protection mechanisms allow the execution of safety and non-safety software on the same ECU without interference. The time-consuming validation of non-safety software is therefore no longer necessary. Via CODESYS® safe data communication is achieved by the standardized CANopen® Safety protocol of the control units. In case of a safety-relevant failure, outputs can be shut off in (up to 3) groups allowing limp-home functionality.

The safety certified CODESYS® Safety SIL 2 with its validated compiler and code generator speeds up application development significantly.

Application Fields

- Large construction / material handling machines
- Large municipal vehicles
- Large agricultural machines

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Connectivity

While in smaller machines a single HY-TTC 500 controller can take over the control of the whole vehicle, in more demanding applications several ECUs will be necessary. For these machines the ideal master ECU not only supports multiple CAN interfaces, but also connectivity for all other commonly used communication technologies. For example, the HY-TTC 590 ECU is equipped with 7 CAN channels, Ethernet, BroadR-Reach®, RS232 and LIN.

Robustness and Performance

The freely programmable high-end control units with a powerful dual-core ARM Cortex®-R4 lockstep processor are protected by a compact, automotive-style housing suited for harsh environments.

Variant Overview

	HY-TTC 590	HY-TTC 580	HY-TTC 540	HY-TTC 510	HY-TTC 508
CPU core	32-bit Texas Instruments TMS570, ARM cortex-R4F based, dual-core lockstep CPU and memory protection for safety-relevant applications, 180 MHz				
	3 MB int. Flash, 256 kB int. RAM, 2 MB ext. RAM				
	32 MB ext. Flash	8 MB ext. Flash			16 MB ext. Flash
	32 kB ext. FRAM	64 kB ext. EEPROM			
	Safety companion				
Interfaces	6 x CAN, up to 1 Mbit/s 1 x CAN ISOBUS	7 x CAN, up to 1 Mbit/s	4 x CAN, up to 1 Mbit/s	3 x CAN, up to 1 Mbit/s	2 x CAN, up to 1 Mbit/s 1 x CAN ISOBUS
	1 x BroadR-Reach®, up to 100 Mbit/s	1 x Ethernet, up to 10 Mbit/s			1 x BroadR-Reach®, up to 100 Mbit/s
	1 x RS-232				
	1 x LIN serial interface			1 x LIN serial interface	
Number I/Os	36 inputs / 60 outputs (36 x PWM)		52 inputs / 44 outputs (28 x PWM)	44 inputs / 40 outputs (16 x PWM)	44 inputs / 32 outputs (10 x PWM)
Sensor supply	1 x sensor supply 5 - 10 V / max. 2.5 W / configurable by software in 1 V steps				1 x sensor supply 5 V / max. 500 mA
	2 x sensor supplies 5 V / max. 500 mA				
RTC	1 x RTC				1 x RTC
Internal	Internal monitoring of board temperature, sensor supply and supply voltage Power-On via K15 or Wakeup-Pin				
Software	C-Programming / C-Programming extended with SAFERTOS® integration / CODESYS® Safety SIL 2 / CODESYS®				C-Programming
	CODESYS® V3.x including support for CANopen® Master				
Functional Safety	IEC 61508 :2010 SIL 2 / EN ISO 13849 :2015 PL d available for C-Programming environment only: ISO 25119:2018 AgPL d / ISO 26262:2018 ASIL C				

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