MOBATIME

SWISS TIME SYSTEMS

HIGH-PRECISION TIME SERVER, GRANDMASTER & PRTC

DTS 4163.GRANDMASTER

The DTS 4163.grandmaster is a PTP grandmaster specifically designed for digital substations according to IEC 61850. With its high precision and seamless redundant operation, it offers a high degree of reliability and availability.



HIGHLIGHTS

PTP GRANDMASTER FOR DIGITAL SUBSTATIONS ACCORDING IEC 61850

The DTS 4163 is a primary reference time clock (PRTC) and PTP grandmaster according to IEEE 1588-2008 / PTPv2, with IEEE 1588-2019 / PTPv2.1 compability, for the highly accurate synchronization of clients.

PRP/HSR SUPPORT

The DTS 4163 features a pair of redundant interfaces (PRP/HSR) to directly connect the device as a DAN (dual attached node) with full 1Gbps bandwidth.

HIGH-PERFORMANCE NTP SERVER

The DTS 4163 can reply to more than 10'000 NTP and SNTP requests per second (up to 600'000 clients depending on NTP client configuration).

GNSS RECEIVER

The DTS 4163 can simultaneously receive all GNSS L1 systems (GPS+QZSS/SBAS, Galileo, GLONASS, BeiDou), guaranteeing utmost accuracy and availability.

BOUNDARY CLOCK CAPABILITY

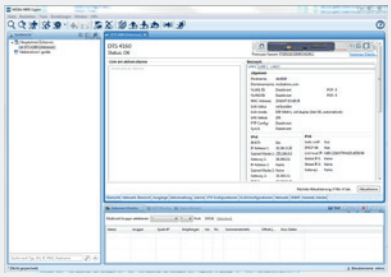
The DTS 4163 can be used as boundary clock to bridge different time domains using two external PTP servers and serve up to four other domains with clients.

OSCILLATOR OPTIONS

The DTS 4163 offers different oscillator options (see page 3 for variants).

LEGACY OUTPUTS

The DTS 4163 outputs support many legacy signals such as IRIG, ToD, DCF, pulse, and frequency.

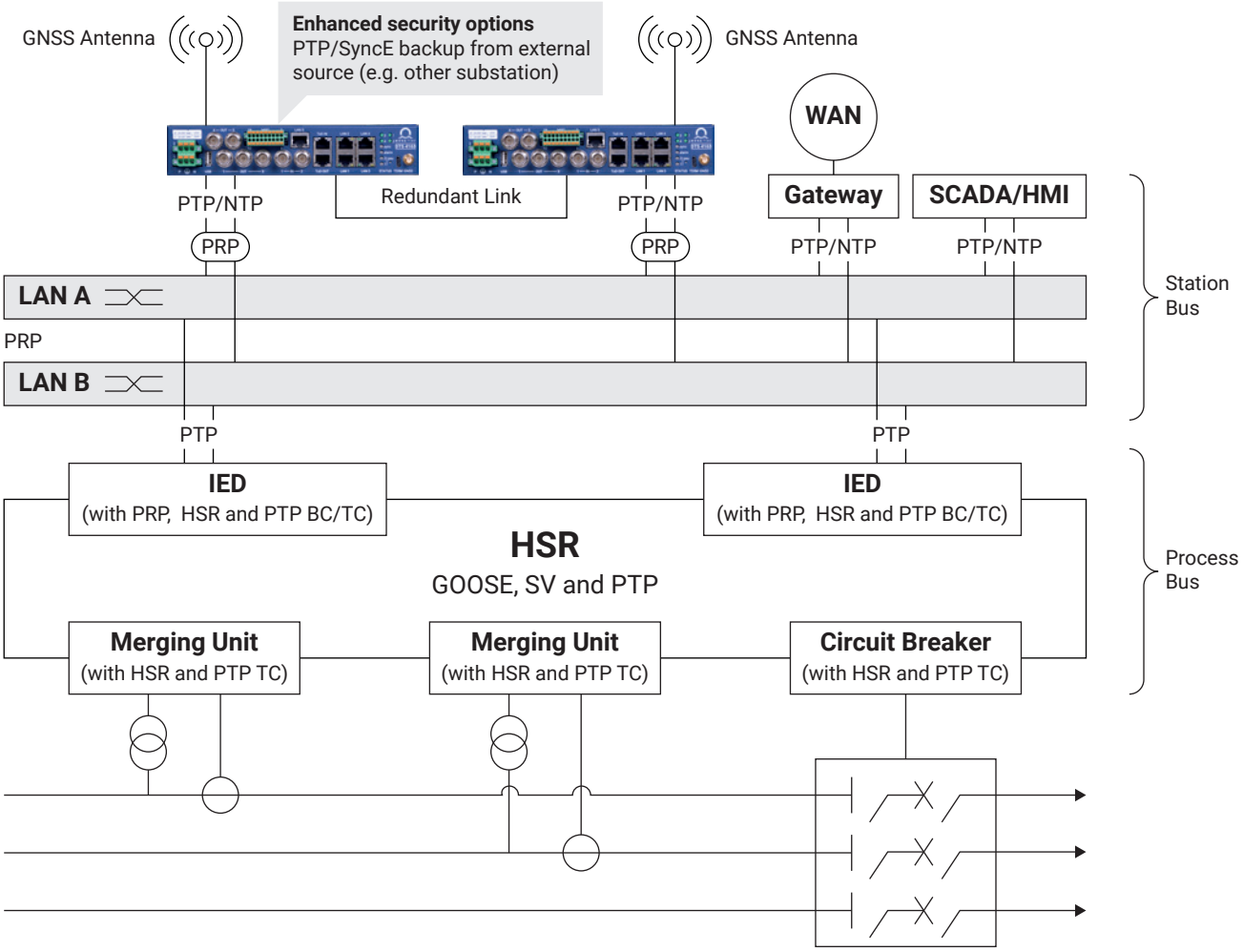


NETWORK MANAGEMENT SYSTEM

MOBA-NMS

The DTS 4163.grandmaster can be fully monitored, configured and controlled using the Mobatime Network Management System software (MOBA-NMS).

APPLICATIONS



TECHNICAL DATA

CONFIGURATION

Variants

The DTS 4163.grandmaster can be configured to suit your needs. Below is a simplified order key:

DTS 4163. **1** **2** . **3**

1 **Oscillator**

A	TCXO 50PPM
E	OCXO 1PPB

2 **Power supply**

CC	2x 24/48VDC
FF	2x 110-250VDC / 100-240VAC, 50/60Hz

3 **Cooling/signal output**

CCC.0A	RJ45 network, passive cooling, BNC signal output
FFC.0B	SFP network, passive cooling, ST signal output

For full order code and variants list, see product manual

MECHANICAL DATA AND ENVIRONMENT

General data

Dimensions: 222 x 44 x 222 mm
With rack kit: 483 x 44 x 222 mm (19", 1U)
Weight: approx. 2 kg (depending on version)
Housing material: steel (powder coated)
Protection degree: IP 20
Operating temperature: -20–50 °C
Operating humidity: 5–95 % relative, no condensation
Power supply: depending on version
MTBF: > 250 000 h

STANDARDS

Conformity

The DTS 4163.grandmaster conforms to the following agency approvals[1]:

CE, UKCA, CB, RoHS, WEEE

EMC:	IEC 61850-3[2], IEC 61000-3-2, 61000-3-3, IEC 61000-6-2, 61000-6-4
Safety:	IEC 62368-1

[1] For full list, see product manual
[2] For an in-field intelligent electronic device

REFERENCE SIGNAL INPUTS

- 1x GNSS RF input (for GNSS antenna) to internal GNSS receiver, 92 channels, tracking sensitivity -167 dBm
- 2x PTP (from other PTP grandmaster, as PTP slave)
- 1x DCF current loop (e.g. GNSS 4500)[1]
- 2x F-IN (1 PPS, 10 MHz, 2.048 MHz) (for hold-over enhancement only)

REFERENCE SIGNAL OUTPUTS - NETWORK

- PTP grandmaster (E2E, P2P, 1-step, 2-step, multicast, layer 2, IPv4/IPv6) (LAN 1–4)
- PTP profiles: default E2E/P2P; power utility (IEEE/IEC 61850-9-3); Power Profile IEEE C37.238 (2011/2017); telecom ITU-T G.8265.1, G.8275.1, G.8275.2; gPTP IEEE 802.1AS
- SyncE master, ESMC (SSM)
- NTP server (>10'000 requests/second on all 4 ports combined)
- NTP mode: Server, Peer, Broadcast, Multicast / SNTP / MD5 and SHA1 authentication for NTP
- TIME (RFC 868), DAYTIME (RFC 867)

REFERENCE SIGNAL OUTPUTS - NON-NETWORK

- 3/4x precision pulse/frequency/signal output (1PPS to 10 MHZ or IRIG-B 00x)
- 1x IRIG-B-12x AM analog
- 1x ToD
- 2x serial output, RS-422
- 2x configurable event switch
- 2x event timestamper

SEAMLESS NETWORK REDUNDANCY

- LAN 1 and 2 can be configured to be connected as DAN (dual attached node) to either a PRP or HSR network (according IEC 61850)

NETWORK INTERFACE

- 4x 100/1000BaseT (LAN 1–4) or 4x SFP for miniGBIC module
- 1x 100/1000BaseT (LAN 5) management[1]

NETWORK FEATURES

- PTP grandmaster / SyncE master / NTP V4/V3 server (RFC 5905/1305) / SNTP (RFC 4330)
- IP configuration: IPv4 (DHCP, static IP), IPv6 (autoconfiguration, DHCPv6, static IP)
- Link aggregation (IEEE 802.3ad) over 2 / dedicated LAN interfaces (LAN 2 & 3)
- VLAN: prioritized (IEEE 802.1p), tagged (IEEE 802.1Q)
- Static routing
- IGMP / Multicast (RFC 3376, 1112, 4601, 3973)
- User authentication with Radius (RFC 2865), LDAP (RFC 4511) and secure LDAP (RFC4513)

ALARMS

- Electrical switch: relay contact[1]
- Network outputs (LAN 1–5): SNMP notifications (Traps) V2c, Mail (RFC 4954, 2195)
- Alarm LED
- Syslog (RFC 5424)

OSCILLATOR STABILITY

- Holdover (after 24h synchronization) at room temperature according to oscillator (see variants)

ACCURACY (TYPICAL VALUES)

- Internal
  - GNSS to internal time: < +/- 50 ns
  - PTP to internal time: < +/- 50 ns
  - DCF to internal time (with GNSS 4500): < +/- 50 ns (after compensation for fix offset)
  - F-In to internal time: < +/- 50 ns (frequency only)
- Time signal output
  - GNSS to NTP: < +/- 100 µs
  - GNSS to pulse/frequency: < +/- 50 ns
  - GNSS to IRIG (AM): < +/- 200 µs
  - GNSS to IRIG (DC): < +/- 50 ns
  - GNSS to serial output: < +/- 10 ms (Jitter <10 ms)

MANAGEMENT & SUPERVISION

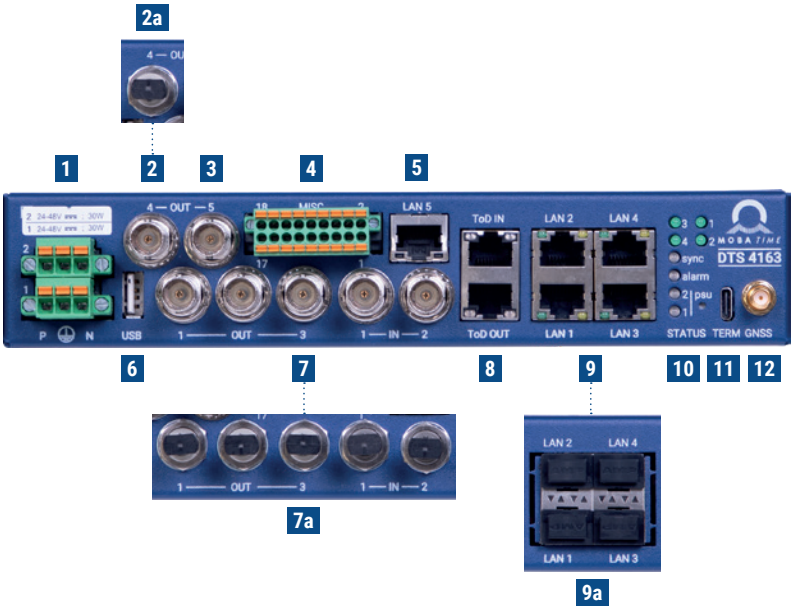
- MOBA-NMS; monitoring possible
- Terminal menu: USB-C terminal, SSH
- SNMP (v1/v2c/v3), SNMPv3 with authentication and encryption
- Syslog (RFC 5424)
- System firmware download via SCP, SFTP or USB
- LEDs: Alarm, Power, Sync
- Coming soon: web interface

SECURITY

- Secure by design: hardware based security (secure boot), encrypted user data, encrypted and signed firmware image
- Secure access to the device with SSH, SCP, SFTP, HTTPS (coming soon)
- Security features according IEC 62443-4-2

[1] available on extension A or B

INTERFACES



1	**Power supply**	FKCN plug	90–240 VAC, 50/60 Hz or 80–240 VDC 0.5 A
2	**OUT 4**[1]	BNC (female), 50 Ω	Frequency/PPS/IRIG-B (DCLS)
2a	**OUT 4**[1]	Fiber, ST 820nm	Frequency/PPS/IRIG-B (DCLS)
3	**OUT 5**[1]	BNC (female), 50 Ω	IRIG-B1xx (AM)
4	**Miscellaneous**[1]	DFMC plug	Alarm relay contacts Normally open
			24VDC output
			DCF current loop input for the connection of a GNSS 4500
			Configurable event switch
			Event timestamper
			Serial output, RS-422
5	**LAN 5**[1]	RJ45 100/1000MBit	Management/NTP
6	**USB**	USB host for USB flash drive	For firmware updates and log files
7	**OUT 1-3**	3x BNC (female), 50 Ω	Frequency/PPS/IRIG-B (DCLS)
	IN 1+2	2x BNC (female), 50 Ω	Frequency/PPS

7a	**OUT 1-3**	3x fiber, ST 820nm	Frequency/PPS/IRIG-B (DCLS)
	IN 1+2	2x fiber, ST 820nm	Frequency/PPS
8	**ToD IN**	RJ48	PPS/serial telegram
	ToD OUT	RJ48	PPS/serial telegram
9	**LAN 1**	RJ45 100/1000MBit	Mgmt./NTP/PTP/LAG/HSR/PRP
	LAN 2		Mgmt./NTP/PTP/LAG/HSR/PRP
	LAN 3		Management/NTP/PTP/LAG
	LAN 4		Management/NTP/PTP/LAG
9a	**LAN 1**	SFP	Mgmt./NTP/PTP/LAG/HSR/PRP
	LAN 2		Mgmt./NTP/PTP/LAG/HSR/PRP
	LAN 3		Management/NTP/PTP/LAG
	LAN 4		Management/NTP/PTP/LAG
10	**Status LEDs**	Power (green), alarm (red), synchronization (green) 1-4[1]: see manual	
11	**Terminal**	serial interface for local management, USB-C connector	
12	**GNSS input**	SMA (female), 50 Ω	GNSS antenna signal Antenna supply max. 5 V/100 mA

Connections depending on device variant.
[1] extension required

Do you have any questions?
We are happy to help.

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Product specifications are subject to change without notice.