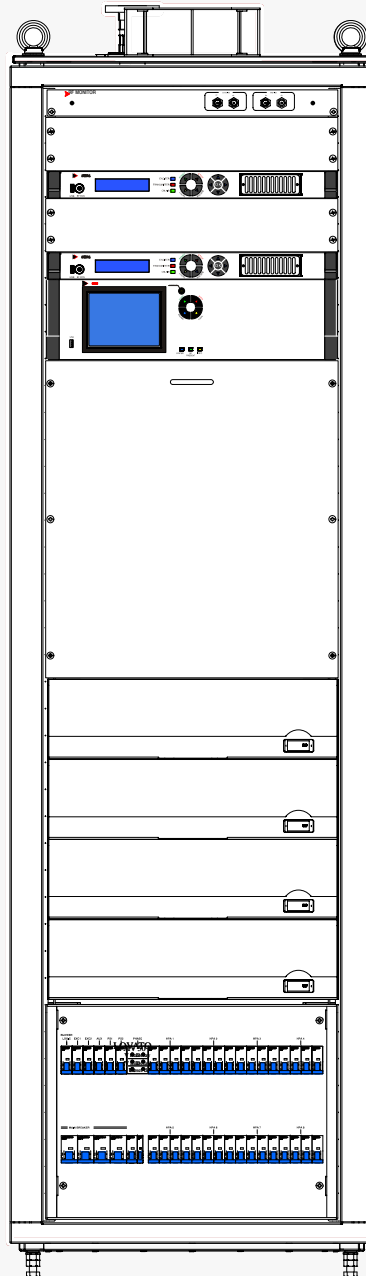


LARAN LINE

NEW LIQUID COOLED TX LINE



LARAN LINE UHF CONFIGURATIONS

Tab. 1 – Laran line configuration data

number of HPAs	STANDARD	PWR (KW) <i>(TYPICAL, MER 33dB)</i>	RF OUT CONNECTOR (EIA flanged)
2 HPA	<i>DIGITAL TV standards</i>	3.0	1-5/8"
	ATSC	4.3	
	ANALOG	8	3-1/8"
3 HPA	<i>DIGITAL TV standards</i>	4.5	1-5/8"
	ATSC	6.5	3-1/8"
	ANALOG	12.5	
4 HPA	<i>DIGITAL TV standards</i>	6.0	3-1/8"
	ATSC	9.0	
	ANALOG	16.5	
5 HPA	<i>DIGITAL TV standards</i>	7.5	3-1/8"
	ATSC	11.0	
	ANALOG	20.0	
6 HPA	<i>DIGITAL TV standards</i>	9.0	3-1/8"
	ATSC	13.0	
	ANALOG	25.0	

LARAN LINE LIQUID COOLED TRANSMITTERS

Itelco has recently renewed its range of liquid cooled solid-state transmitters for broadcasting market, in UHF frequencies, introducing the Laran line.

The new line maintains the traditional safety features of Itelco transmitters and improve the easy of intervention by the operators thanks to the extremely simple design.

The manufacturing process optimization allows Itelco to be extremely competitive, meeting the customer needs in terms of operating costs reduction, ease of maintenance and spare parts management.

Laran liquid cooled transmitter, that perfectly meets the needs of customers that require solutions of medium power, is capable of delivering approximately up to 25 kWps (9 kW DVB) in UHF, implemented on a single rack (19").

One outstanding feature of Laran transmitters is their Multi-Standard Capability which makes them compatible with all worldwide standards used for digital transmission, with a special attention to latest development. Both lines represent a Multi-Standard platform supporting DVB-T2, DVB-T/H, ISDB-T/Tb, ATSC, and Analog TV.

All transmitters of Laran lines are completely Dual-Cast. The use of latest LDMOS technology allowed Itelco to realize the new lines of liquid cooled transmitters giving particular attention to compactness, with minimum space requirements inside the station, and to operational costs, with an impressive power consumption reduction.

Laran transmitters are characterized by an integrated liquid cooling system, realized using a *Closed Loop circuit* (with two circulators), *heat exchanger* and a *cold plate* inside each amplifier module. The circulators convey the heat transferring fluid towards the heat exchanger; here the fluid releases heat to the external environment, so its temperature is regulated. Then an inlet branch conduct splits equally the

flow rate among module cold plates. The module cold-plates allows to dissipate the high thermal power produced by the amplifier stages.

Each unit composing the transmitter is self-cooled using independent blowers. This gives to Itelco customers the possibility to easily test every unit outside the transmitter rack, on a station or laboratory desk.

The transmitter control logic guarantees a complete management of all units composing the equipment, through a CAN-bus connection, allowing a real time, extremely safe and robust data exchange. Each unit is additionally equipped with a USB port for a local connection.

The equipment control allows transmitter operating conditions optimization, even during service operation on a unit, including power consumption and output power optimization.

The simplicity of Laran interconnection and cabling, allows Itelco customers to easily install and maintain the equipment.

In order to guarantee maximum redundancy also on control section, Laran transmitters have been realized with possibility to operate without Control Logic. Not only the transmitter is maintained in operating condition in the last selected state, but it is possible to switch on/off the transmitter.

The system architecture, with the use of redundancy elements, guarantees in any case the absence of service interruptions, also during technical assistance operations. Particular attention has been dedicated to the realization of an extremely safe equipment, especially to guarantee personnel maximum safety during service operations. In case of maintenance operation on one of the transmitter unit, all unit parts under electrical power supply are automatically disconnected.

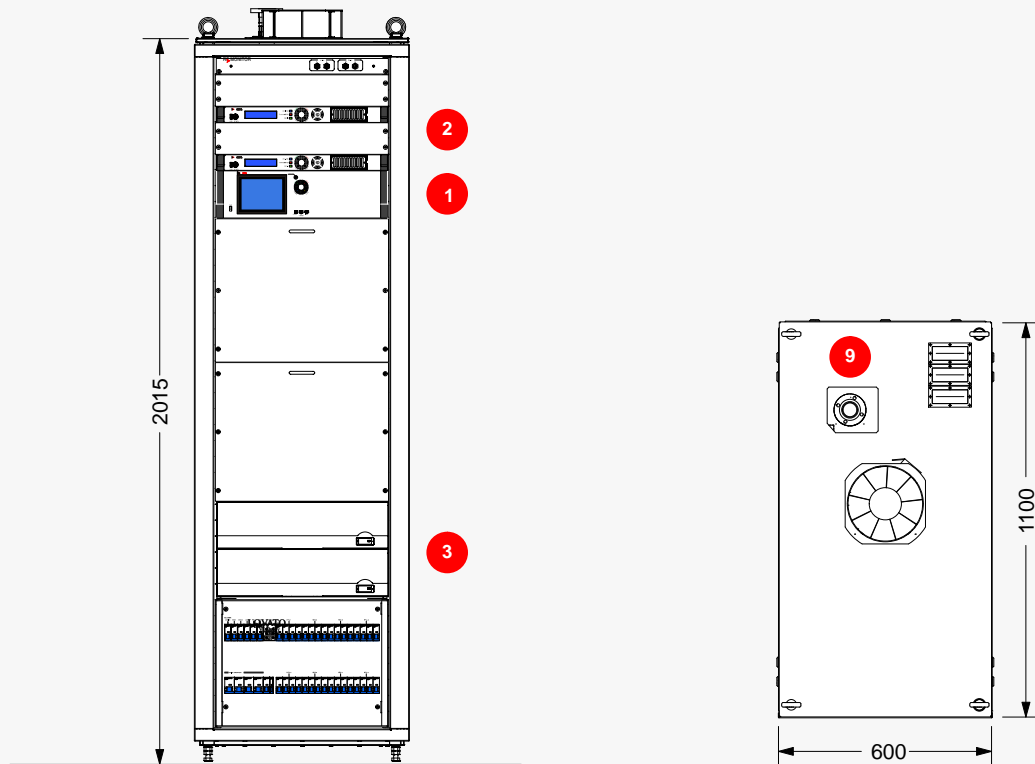
MAIN FEATURES

- **Multi-Standard operation**
(DVB-T/H/T2, ATSC, ATSC 3.0, ISDB-T/Tb, Analog –all standards)
- **Dual-Cast operation** (optional)
- **Fully broadband** on UHF frequencies
- **Doherty technology** (optional)
- **Latest LDMOS** technology for HPA
- **Hot-pluggable** HPA
- **USB port** for HPA section
- **MEX-II** multi-standard exciter
- **Seamless inputs** between ASI and/or IP (with priority) all combinations in SFN
- **Adaptive precorrection**
- **2 ASI**
- **2 GbE** available inputs
- **Extremely** compact design
- **Modular** design
- **Easy installation** and maintenance
- **Band-pass filter** option (outside Tx cabinet)
- **SNMP / Web Server** remote control
- **CAN-bus** internal communication
- **Internal GPS** for SFN operation (optional)
- **Remote** software/firmware upgrade
- **High Efficiency** liquid cooling system

SPECIFICATIONS

RF DATA	
Frequency range	470 to 860 (870) Mhz <i>class AB</i> <i>Doherty mode</i>
<ul style="list-style-type: none"> UHF band IV-V 	
RF Output power	<i>refer to Tab. 1</i>
RF Output connector	<i>refer to Tab. 1</i>
Shoulder	> 38 dB
MER	> 35 dB (DAB > 30 dB)
Crest factor	8.5 to 9.5 dB
Spurious Emissions	<-60 dBc (< -70 dBc with filter)
Harmonic Emissions	<-60 dBc (< -70 dBc with filter)
In band Spurious Emissions	<-70 dBc
STANDARDS	
<ul style="list-style-type: none"> Digital TV 	
Standards	DVB-T (<i>fully compliant with EN 300 744, TS 101 191</i>) DVB-T2 (<i>EN 302 755, TS 102 773; TR101 290; TS 102 2831</i>) ISDB-T/T _b (<i>ARIB STB-B31, TR-B14</i>) ATSC, ATSC Mobile DTV, ATSC 3.0
Channel Bnadwidth	
<ul style="list-style-type: none"> DVB-T DVB-T2 ISDB-T/T_b ATSC 3.0 	5/6/7/8 MHz 1.7/5/6/7/8 MHz 6/8 MHz 6 MHz, 7 MHz, 8 MHz
Inputs	
<ul style="list-style-type: none"> DVB-T/T2, ISDB-T/T_b, DTMB ATSC, ATSC 3.0 	2 BNC 75 Ω, DVB ASI, TS 188/204 packets, continuous and burst mode, 2 RJ45 GbE 2 SMPTE310M or 2 ASI, 75 Ω BNC, 2 RJ45
<ul style="list-style-type: none"> Analog TV 	
Standards (compliance to CCIR report 642-2 volume XI part I, ETS 300 384)	B/G/D/K/K1/M/N/I/I1/L
Color transmission	PAL, NTSC, SECAM
Sound transmission	IRT dual-sound config, FM single sound and NICAM728 (-13 dB/-20 dB) <i>optional</i> , FM single sound (-10 dB)
Inputs	
<ul style="list-style-type: none"> Video Audio Additional Audio NICAM audio NICAM data input 	2 BNC 75 Ω, 1 V _{pp} ± 6 dB. Manual Gain or AGC on ITS line, DC Restore, White Limiter (85-95%), Sync Restore (20-30%) 2 XLR 600 Ω/5 kΩ balan/unbal, 0 dBm -3 dB +19 dB. In wideband mode input 2 works up to 120kHz (MPX) 1 BNC 50 Ω/5 kΩ for MPX (up to 120 kHz) and 1 BNC 50 Ω for auxiliary services for standard M 2 XLR 600 Ω/5 kΩ balan/unbal, 0 dBm ± 10 dB 1 BNC TTL 728 Kbit/s ext. data, 1 BNC TTL 728 kHz ext. clock
MAINS SUPPLY VOLTAGE	
Ac supply	single phase 208V _{ac} - 230V _{ac} three phase + N + PE 3 x 208V _{ac} 3 x 230V _{ac} 3 x 400V _{ac}
Frequency	50/60 Hz ± 4%
Power factor	> 0.95
Efficiency (COFDM) <i>with heat exchangers</i>	up to 22% <i>class AB</i> / up to 41% <i>Doherty</i>
Efficiency (COFDM) <i>without heat exchangers</i>	up to 24% <i>class AB</i> / up to 42% <i>Doherty</i>
THD	< 6%
Safety	EN 60215/EN 60950
EMC	EN 301489
REMOTE INTERFACES	
Local control	Display(s), Keyboard(s), and USB ports
Remote control	Ethernet for HTTP (Web Server)/SNMP/NTP/SSL, RS232, Parallel
Test points	RF out monitor, RF amp output, RF exciter output
SYNCHRONIZATION	
Reference frequency	Internal (OCXO or integrated GPS)/Internal locked to the External (BNC 50 Ω, 10 MHz)
Reference pulse	1pps Internal (integrated GPS)/External (BNC 50 Ω, TTL)
Internal reference Accuracy	± 1 · 10 ⁻⁸ (0 to 70 °C) ± 5 · 10 ⁻¹⁰ per day (after 30 day) ± 1 · 10 ⁻⁷ per year

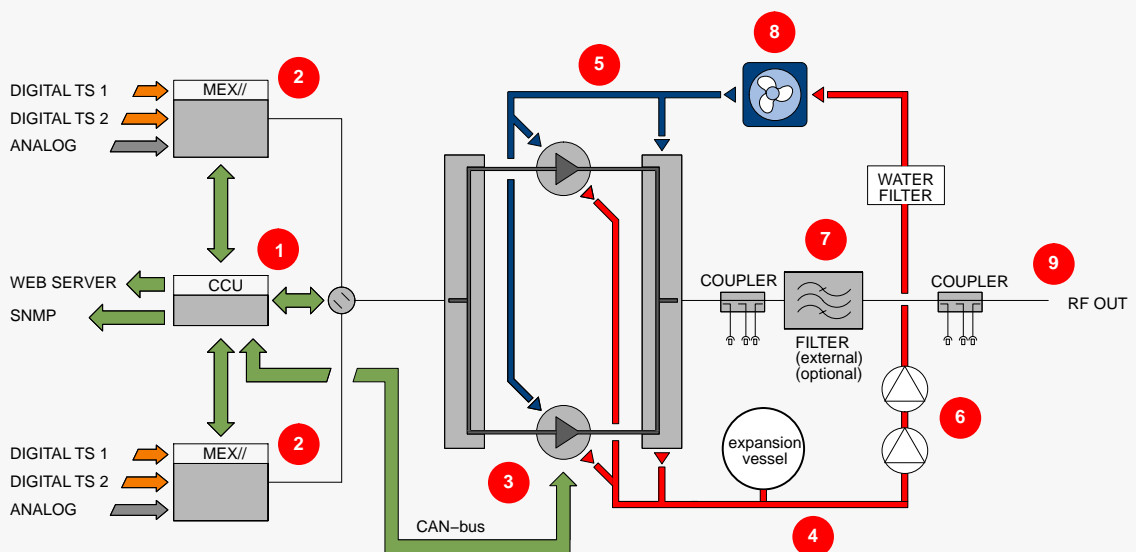
METERING	
■ <i>Digital TV</i>	<ul style="list-style-type: none"> - forward output power - reflected power
■ <i>Analog TV</i>	<ul style="list-style-type: none"> - vision carrier output power - sound carrier output power - forward output power - reflected power
COOLING	
HPAs and output combiner dummy load	liquid
Transmitter cabinet	forced air
MECHANICAL	
RACK	19" – 42 HU/ steel
DIMENSIONS (W x H x D, in mm)	600 x 2015 x 1100
WEIGHTS (kg) (<i>Transmitter Cabinet +dual exciter + 4 HPA</i>)	400
COLOUR	
<i>Cabinets</i>	black
<i>Units</i>	light grey
ENVIRONMENTAL	
Ambient temperature range	0 °C to +55 °C
Storage temperature range	-30 °C to +70 °C
Relative humidity (@ 40 °C)	95% without condensation
Max. Operating altitude (asl)	Up to 3000 meters
Safety rules	EN 60215 / EN 60950
EMC	EN 301489

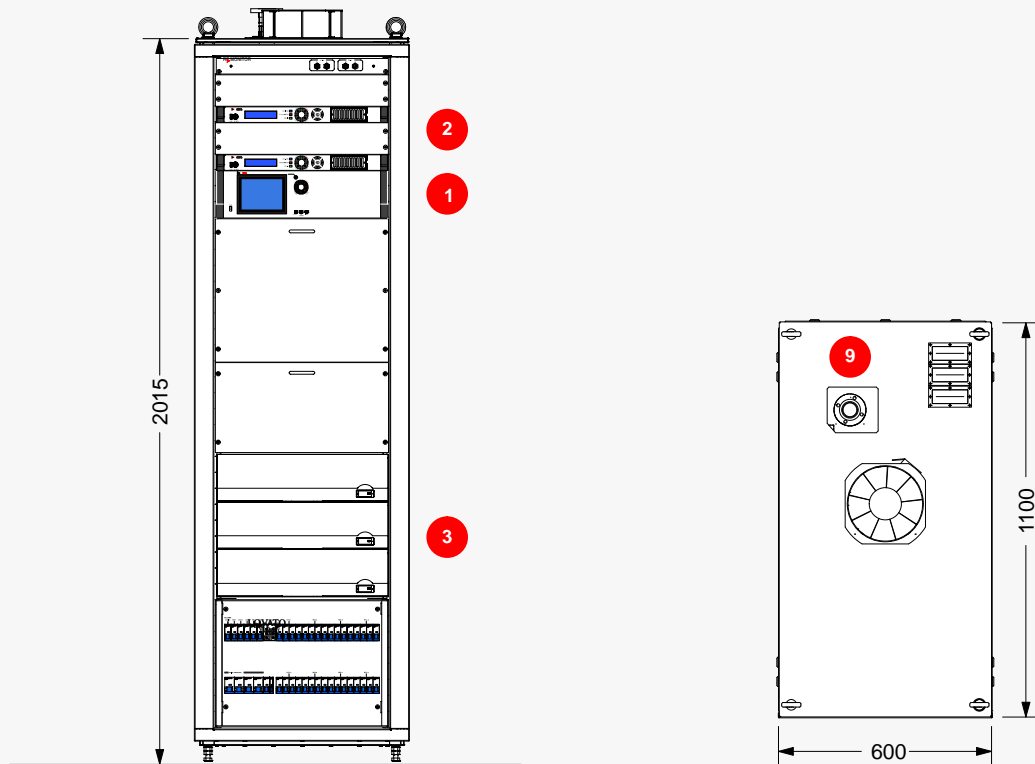


LARAN 2 HPA

1	CCU TX CONTROL UNIT	6	CIRCULATORS
2	MEX// MULTISTANDARD MODULATOR ⁽¹⁾	7	BAND PASS FILTER (external, optional)
3	HPA SECTION	8	HEAT EXCHANGER
4	COOLING CIRCUIT (hot water)	9	RF OUT TO ANTENNA/COMBINER
5	COOLING CIRCUIT (cold water)		

⁽¹⁾ DUAL-DRIVE CONFIGURATION IS OPTIONAL

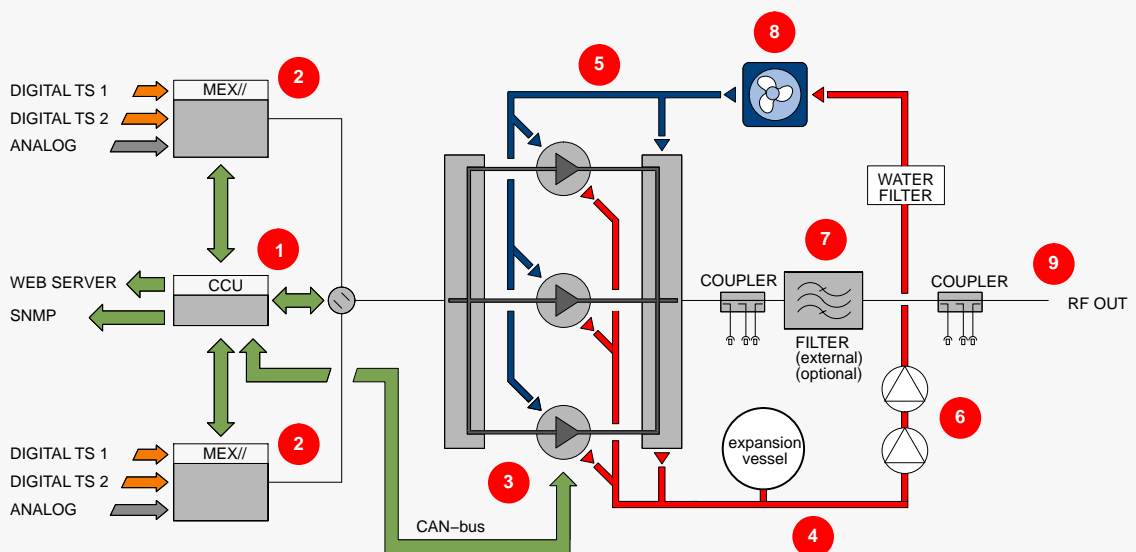


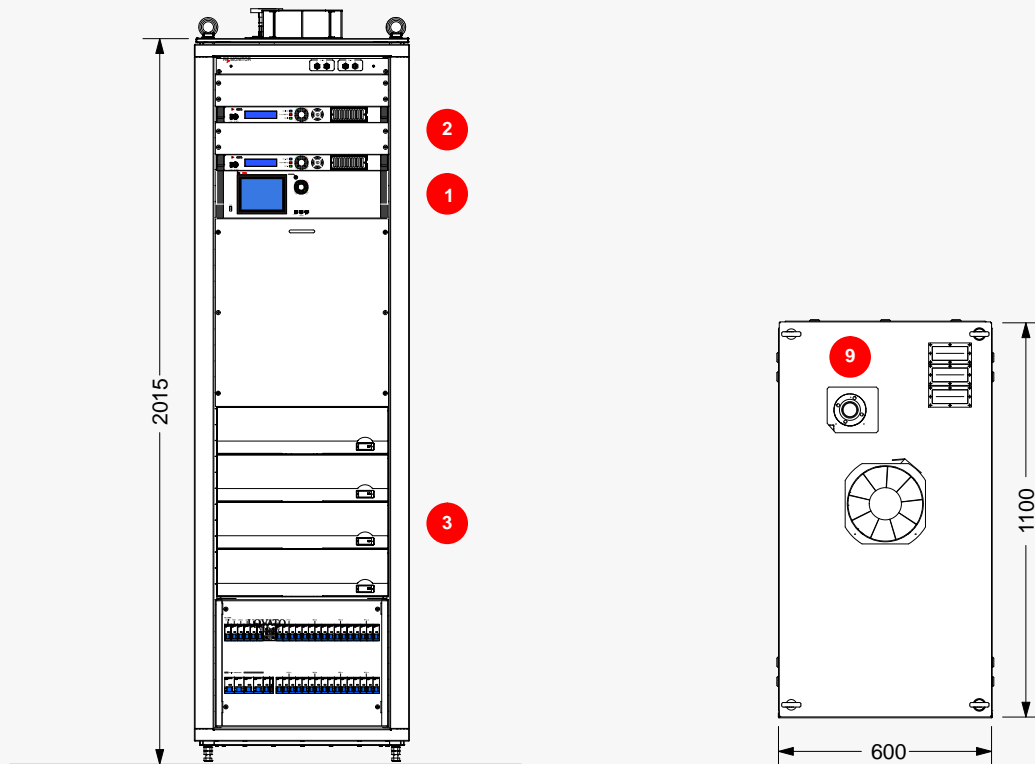


LARAN 3 HPA

1	CCU TX CONTROL UNIT	6	CIRCULATORS
2	MEX// MULTISTANDARD MODULATOR ⁽¹⁾	7	BAND PASS FILTER (external, optional)
3	HPA SECTION	8	HEAT EXCHANGER
4	COOLING CIRCUIT (hot water)	9	RF OUT TO ANTENNA/COMBINER
5	COOLING CIRCUIT (cold water)		

⁽¹⁾ DUAL-DRIVE CONFIGURATION IS OPTIONAL

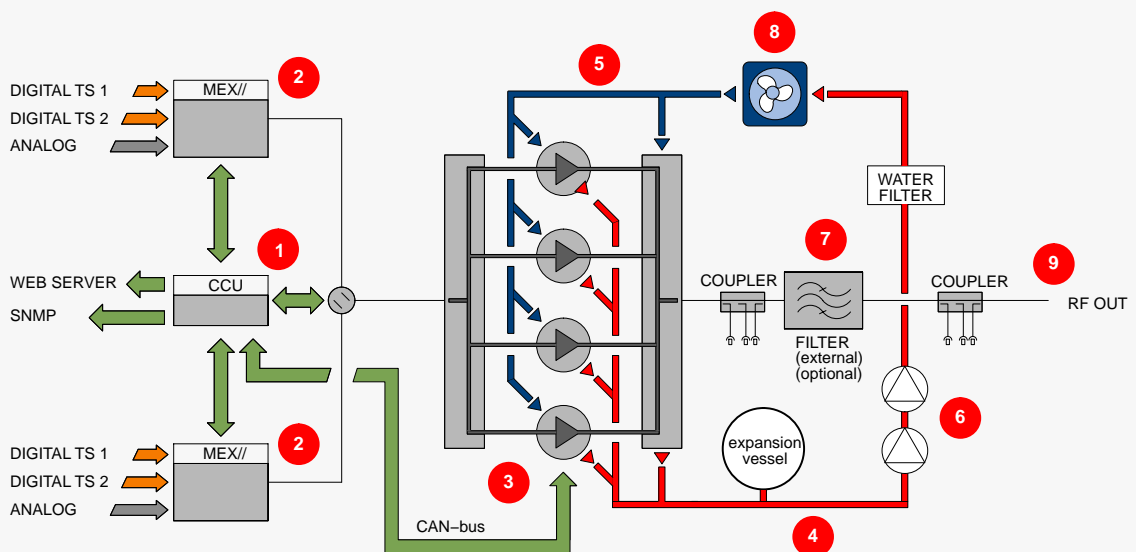


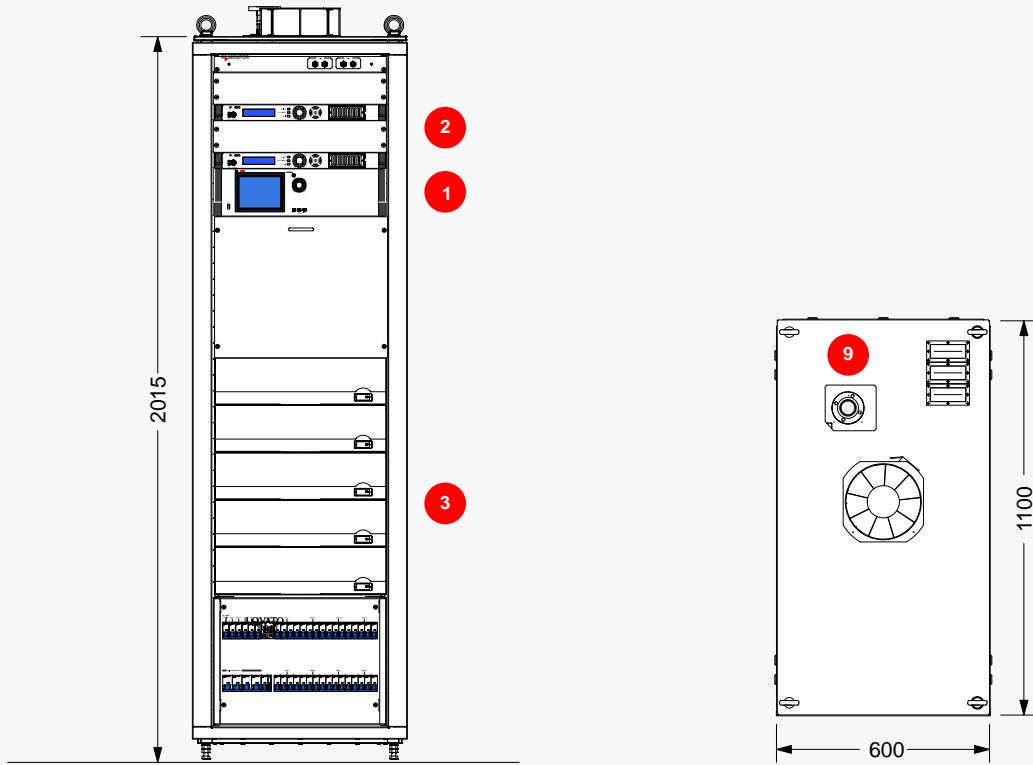


LARAN 4 HPA

1	CCU TX CONTROL UNIT	6	CIRCULATORS
2	MEX// MULTISTANDARD MODULATOR ⁽¹⁾	7	BAND PASS FILTER (external, optional)
3	HPA SECTION	8	HEAT EXCHANGER
4	COOLING CIRCUIT (hot water)	9	RF OUT TO ANTENNA/COMBINER
5	COOLING CIRCUIT (cold water)		

⁽¹⁾ DUAL-DRIVE CONFIGURATION IS OPTIONAL

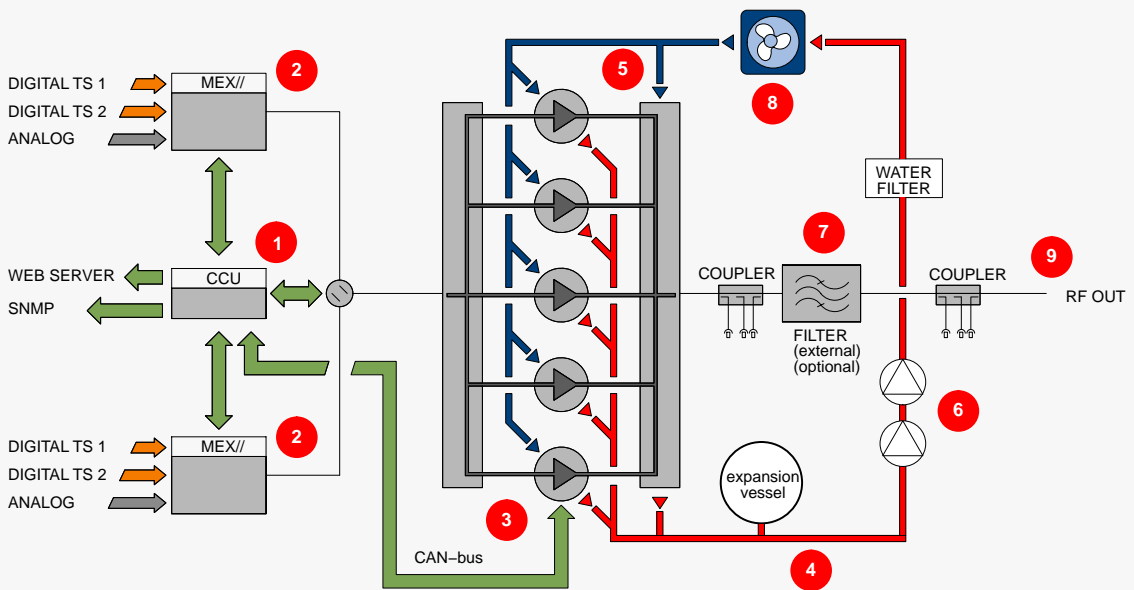


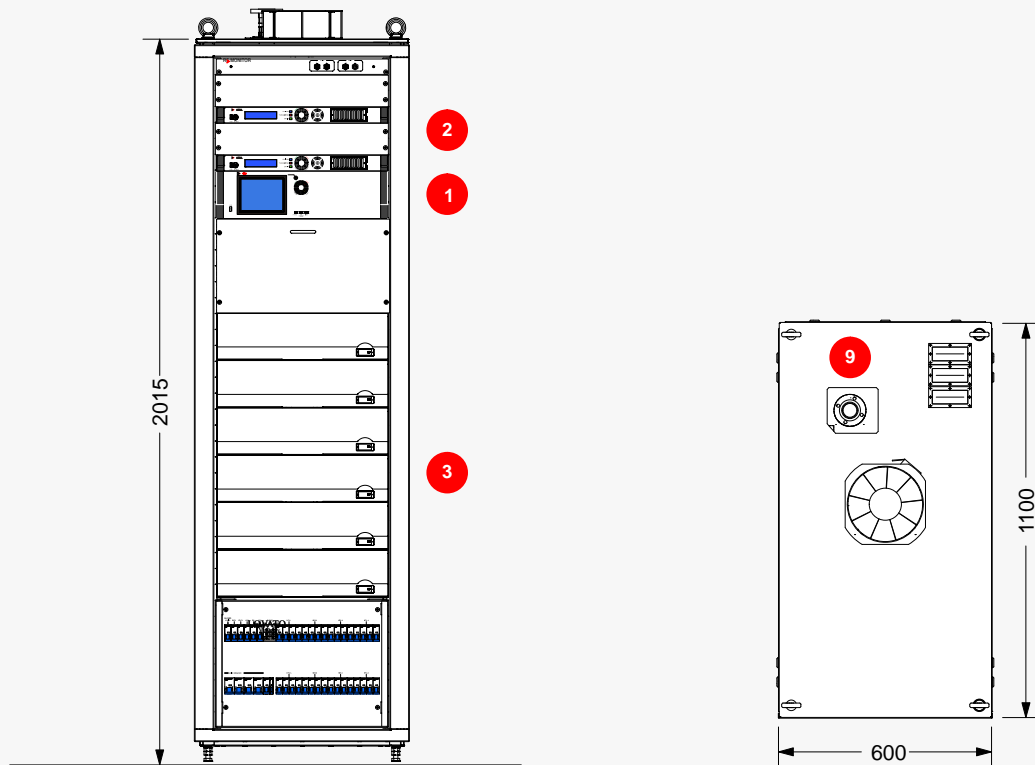


LARAN 5 HPA

1	CCU TX CONTROL UNIT	6	CIRCULATORS
2	MEX// MULTISTANDARD MODULATOR ⁽¹⁾	7	BAND PASS FILTER (external, optional)
3	HPA SECTION	8	HEAT EXCHANGER
4	COOLING CIRCUIT (hot water)	9	RF OUT TO ANTENNA/COMBINER
5	COOLING CIRCUIT (cold water)		

⁽¹⁾ DUAL-DRIVE CONFIGURATION IS OPTIONAL

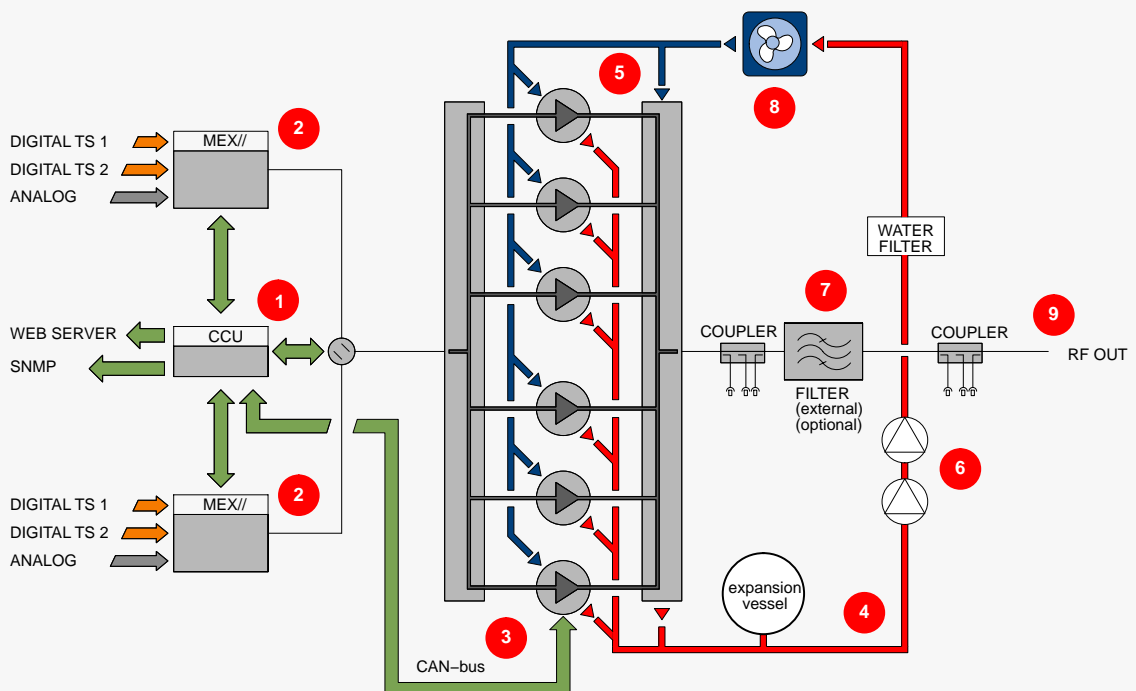




LARAN 6 HPA

1	CCU TX CONTROL UNIT	6	CIRCULATORS
2	MEX// MULTISTANDARD MODULATOR ⁽¹⁾	7	BAND PASS FILTER (external, optional)
3	HPA SECTION	8	HEAT EXCHANGER
4	COOLING CIRCUIT (hot water)	9	RF OUT TO ANTENNA/COMBINER
5	COOLING CIRCUIT (cold water)		

⁽¹⁾ DUAL-DRIVE CONFIGURATION IS OPTIONAL



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