FAQ TruConvert Series

FAQ TruConvert Series

Project Planning FAQs

Q1: ***What products does the TruConvert product family offer and what are their rated powers?***
A1:   DC 1008 8kW - 25% overload for 10 minutes - 50% overload for 1 minute
       DC 1010 10 kW - no overload
       DC 1030 30 kW - no overload
       AC3025 25 kVA 25% overload for 10 minutes - 50% overload for 1 minute

Q2: ***What are the supported battery levels by the TruConvert product family?***
A2: TruConvert Products support 3 battery levels:
   1-DC1008-DC1010 have a voltage range between 0VDC and 75VDC. Current can be delivered at 0V which is useful for flow batteries.
   2-DC1030 has a voltage range between 100VDC-700VDC. The DC- link voltage should always be at least 50VDC higher than the battery voltage.
   3-Voltages of up to 950V can be directly connected to the AC3025 (DC-Link). DC-Link minimum voltage is √2 / √3 AC Three Phase voltage (ex: Germany 400V).

Q3: ***Are there any further components required for the TruConvert devices to operate?***
A3: System Control is essential for the system and can communicate with up to:
   1.   16 ACs as slaves
   2.   16 DCs as slaves
   3.   16 ACs as slaves and 64 DCs as sub-slaves

Q4: ***How to communicate and control the TruConvert devices?***
A4: Communication from the customer side is done by using Modbus to connect to the system control.

Q5: ***In a system consisting of multiple ACs and DCs, is it possible to control individual devices?***
A5: Each AC or DC device can be controlled individually by selecting the respective slave number using Modbus. Furthermore, all the devices can be controlled together by using slave number "0" which is broadcast.

Q6: ***Can the AC3025 operate an Island Mode and blackstart it?***
A6: AC3025 is capable of both islanding mode and grid tied mode for the supported regions with acquired certificates. Blackstart function is also supported for islanding mode.

Q7: ***Can the 3 phases of the AC3025 be loaded asymmetrically?***
 A7: AC3025 runs symmetrically or asymmetrically. For grid tied mode up to 8.3 kVA per phase. For island mode: ….
   Symmetrical mode has 1 Modbus register for total apparent power in kVA and cos phi for total power factor. Asymmetrical has Modbus registers for each phase.

FAQ TruConvert Series

Q8: *Can the AC power be limited?*
A8: Individual phase currents can be limited.

Q9: *Can multiple AC3025 be connected together and also be connected to multiple DC products?*
A9: All units are modular and expandable to the MW order. They can work alone or together with no
limit on the maximum number of installed devices.

Q10: *Since the System Control can connect with up to 16 Slaves and 64 sub-slaves, what happens if
more are needed in a system?*
A10: A second system control can be added to control the extra units.

Q11: *Does the TruConvert family come with an embedded Energy Management System?*
A11: Customers must have their own energy management system to control the system, as there is no
embedded support or detection for grid meters or batteries. System management and monitoring is
also done by the customer's energy management system.

Q12: *Can the DCs operate individually from the ACs or vice-versa? Is an operation with 3rd party
devices permitted?*
A12: The TruConvert products can operate together or alone. DC and AC products can be both utilized
together to form a complete system or individual components with 3rd party devices topology is
also possible. Please get back to Trumpf in this case.

Q13: *Can the battery current and voltage be limited?*
A13: Maximum charge current, maximum charge voltage, maximum discharge current, minimum
discharge voltage, and maximum power can be set for each DC device.

Q14: *What has been introduced with the new DC1008/DC1010 series?*
A14: The new DC series can now pre-charge the DC-link directly from the battery power

Q15: *Can the AC3025 pre-charge the DC-link?*
A15: The AC3025 has a built-in pre-charge unit.

Q16: *How to control the DCs when connected to an AC3025 or when is being operated without an
AC3025 as a direct slave to the system control?*
A16: When the DCs are connected directly to AC3025 devices, no direct control is needed for the DC, as
it automatically charges or discharges the battery so that ultimately the system feeds in or from the
grid with the given power set-point. When the DCs are operating independently from the AC3025,
being connected directly to the system control, Voltage Droop Mode dictates the charging or
discharging currents based on the voltage of the DC-Link

Q17: *Can the DC 1008 be connected in series to increase the battery voltage input range?*
A17: A series connection of multiple DC 1008 units is not possible.

Q18: *Does every AC 3025 require its own external contactor?*
A18: Within a system consisting of multiple AC 3025, each unit needs to have its own contactor. This allows to operate the units independently and increases redundancy in case of failures within single inverters.

Q19: *What is the reaction time of the AC 3025?*
A19: For current source operation (grid tied): <75ms
For voltage source operation (island): <200ms

Q20: *The TruConvert system doesn't reach the commanded power setpoint?*
A20: Differences between power setpoint and actual power can have several root causes. Most of the time one of the implemented limiting controllers is active and is limiting the power setpoint. For DC 1008 register 5123 (DcDcCurrentLimitingMode) is showing the status of active limiting controllers. The AC 3025 power limiting status can be read out over register 5024 (AcDcPowerLimitingStatusAct).

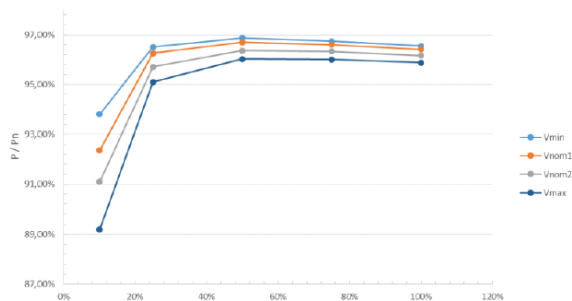Q21: *What is the efficiency of TruConvert Devices?*
A21:

TruConvert AC3025 G2
Charging Efficiency

Charging : 400V 50Hz

Efficiency measurement conditions test results (charging process)

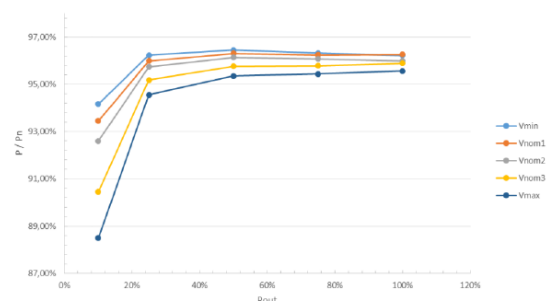| TruConvert AC3025 – 400V 50Hz						
		Power in [W] (nom. 25 kW)				
Input voltage [Vdc]		10%	25%	50%	75%	100%
		2,5 kW	6,25 kW	12,5 kW	18,75 kW	25,0 kW
		η in [%]				
V_{min}	700	93,81	96,51	96,88	96,74	96,55
V_{nominal}	750	92,36	96,26	96,70	96,61	96,42
V_{nominal}	850	91,10	95,71	96,36	96,33	96,17
V_{max}	950	89,18	95,10	96,03	96,01	95,88

Efficiency

Charging : 380V 60Hz

Efficiency measurement conditions test results (charging process)

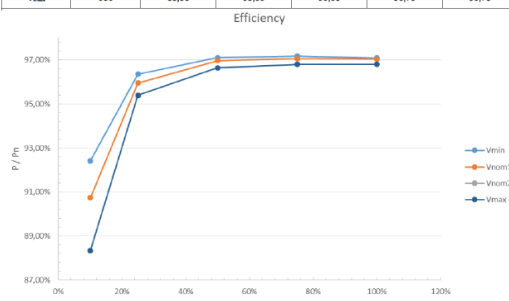| TruConvert AC3025 – 380V 60Hz						
		Power in [kW] (nom. 25 kW)				
Input voltage [Vdc]		10%	25%	50%	75%	100%
		2,5 kW	6,25 kW	12,5 kW	18,75 kW	25,0 kW
		η in [%]				
V_{min}	650	94,17	96,24	96,45	96,32	96,23
V_{nominal}	700	93,45	96,00	96,31	96,25	96,27
V_{nominal}	750	92,60	95,74	96,14	96,08	96,00
V_{nominal}	850	90,45	95,19	95,77	95,79	95,89
V_{max}	950	88,49	94,56	95,36	95,44	95,57

Efficiency

FAQ TruConvert Series

TruConvert AC3025 G2
Charging Efficiency

Charging : 480V 60Hz

Efficiency measurement conditions test results (charging process)						
TruConvert AC3025 – 480V 60Hz						
Input voltage [Vdc]		Power in [W] (nom. 25 kW)				
		10%	25%	50%	75%	100%
		2,5 kW	6,25 kW	12,5 kW	18,75 kW	25,0 kW
		η in [%]				
V_{min}	810	92,42	96,35	97,10	97,17	97,09
$V_{nominal}$	850	90,74	95,95	96,96	97,06	97,04
V_{max}	950	88,35	95,39	96,63	96,79	96,79

TruConvert AC3025 G2
Discharging Efficiency

Discharging : 400V 50Hz

Efficiency measurement conditions test results (discharging process)						
TruConvert AC3025 – 400V 50Hz						
Input voltage [Vdc]		Power in [W] (nom. 25 kW)				
		10%	25%	50%	75%	100%
		2,5 kW	6,25 kW	12,5 kW	18,75 kW	25,0 kW
		η in [%]				
V_{min}	700	96,38	97,36	97,53	97,43	97,30
$V_{nominal}$	750	95,94	97,09	97,36	97,27	97,13
$V_{nominal}$	850	95,25	96,73	97,09	97,02	96,91
V_{max}	950	94,99	96,45	96,84	96,84	96,82
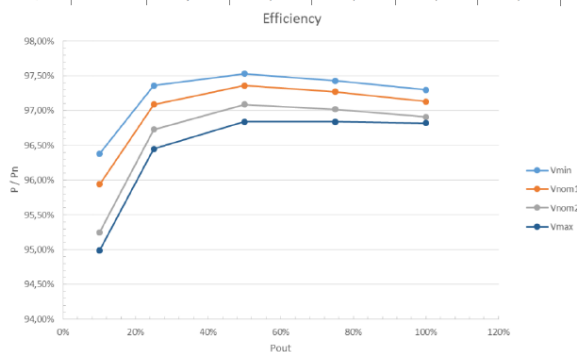
Discharging : 380V 60Hz

Efficiency measurement conditions test results (discharging process)						
TruConvert AC3025 – 380V 60Hz						
Input voltage [Vdc]		Power in [W] (nom. 25 kW)				
		10%	25%	50%	75%	100%
		2,5 kW	6,25 kW	12,5 kW	18,75 kW	25,0 kW
		η in [%]				
V_{min}	650	96,19	97,63	98,00	97,80	97,44
$V_{nominal}$	700	95,74	97,43	97,78	97,59	97,24
$V_{nominal}$	750	95,37	97,63	98,00	97,80	97,44
$V_{nominal}$	850	95,28	96,80	97,33	97,23	97,04
V_{max}	950	94,62	96,41	97,00	96,91	96,58

TruConvert AC3025 G2
Discharging Efficiency

Discharging : 480V 60Hz

Efficiency measurement conditions test results (discharging process)						
TruConvert AC3025 – 480V 60Hz						
Input voltage [Vdc]		**Power in [W] (nom. 25 kW)**				
		10%	**25%**	**50%**	**75%**	**100%**
		2,5 kW	**6,25 kW**	**12,5 kW**	**18,75 kW**	**25,0 kW**
		η in [%]				
V$_{min}$	810	95,88	97,77	97,83	97,78	97,71
V$_{nominal}$	850	95,68	97,07	97,61	97,64	97,59
V$_{max}$	950	95,02	96,74	97,37	97,43	97,41
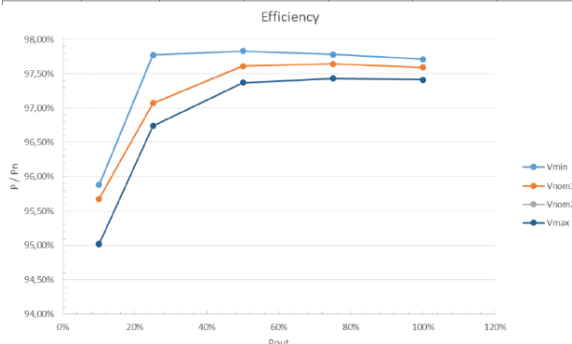
TruConvert DC1008
Charging/Discharing Efficiency

Charging

Efficiency Measurements Charging							
TruConvert DC 1008							
		Power in (W) (nom 8kW)					
		10%	**20%**	**30%**	**5%**	**75%**	**100%**
		800	**1600**	**2400**	**400**	**6000**	**8000**
	30	94.20%	95.87%	96.17%	95.76%	94.88%	94.08%
Battery	**40**	93.41%	95.77%	96.43%	96.61%	96.30%	95.76%
Voltage	**50**	92.42%	95.30%	96.37%	96.92%	96.93%	96.63%
(VDC)	**60**	90.86%	94.65%	96.00%	96.87%	97.14%	97.06%
	70	88.84%	93.90%	95.49%	96.67%	97.17%	97.21%

Discharging

Efficiency Measurements Discharging							
TruConvert DC 1008							
		Power in (W) (nom 8kW)					
		10%	**20%**	**30%**	**5%**	**75%**	**100%**
		800	**1600**	**2400**	**400**	**6000**	**8000**
	30	94.17%	95.74%	96.02%	95.52%	94.36%	93.37%
Battery	**40**	93.94%	95.68%	96.40%	96.62%	96.25%	95.58%
Voltage	**50**	92.78%	95.27%	96.40%	97.01%	97.01%	96.67%
(VDC)	**60**	90.93%	94.57%	96.05%	97.05%	97.35%	97.21%
	70	88.36%	93.73%	95.49%	96.83%	97.37%	97.39%
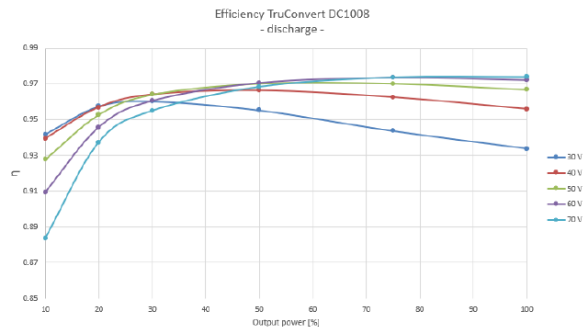
TruConvert DC1030 TL
Charging Efficiency

Efficiency [η] "charge HV => LV"

HV Voltage [V] "DC Link voltage"	LV Voltage [V] "Battery side"												
	100 V	150 V	200 V	250 V	300 V	350 V	400 V	450 V	500 V	550 V	600 V	650 V	700 V
150	0.97												
200	0.97	0.97											
250	0.97	0.98	0.99										
300	0.97	0.98	0.98	0.99									
350	0.97	0.98	0.99	0.99	0.99								
400	0.97	0.98	0.99	0.99	0.99	0.99							
450	0.97	0.98	0.98	0.99	0.99	0.99	0.99						
500	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99					
550	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99				
600	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
650	0.96	0.97	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99		
700	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	
750	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	0.99
800	0.95	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	0.99
850	0.95	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	0.99
900	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	0.99
950	0.95	0.96	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	0.99
Output Power LV [kW]	7.0	10.5	14.0	17.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5

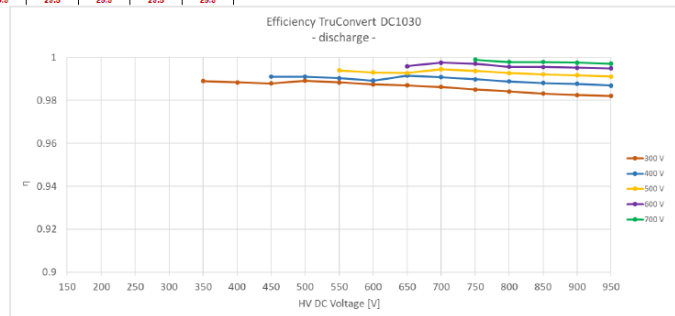Efficiency TruConvert DC1030 - charge -

* Important electrical specifications difference in Released version.
Charge/discharge voltage range will be limited to 200-700V
Max charge/discharge current will be limited to 70A

TruConvert DC1030 TL
Discharging Efficiency

Efficiency [η] "discharge LV => HV"

HV Voltage [V] "DC Link voltage"	LV Voltage [V] "Battery side"												
	100 V	150 V	200 V	250	300 V	350 V	400 V	450 V	500 V	550 V	600 V	650 V	700 V
150	0.97												
200	0.97	0.98											
250	0.97	0.98	0.99										
300	0.97	0.98	0.98	0.99									
350	0.97	0.98	0.98	0.99	0.99								
400	0.97	0.98	0.98	0.99	0.99	0.99							
450	0.96	0.98	0.98	0.99	0.99	0.99	0.99						
500	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99					
550	0.97	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99				
600	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99			
650	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00		
700	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00	
750	0.95	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
800	0.95	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00
850	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00
900	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00
950	0.94	0.96	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00
Input Power LV [kW]	7.0	10.5	14.0	17.5	21.0	24.5	28.0	29.5	29.5	29.5	29.5	29.5	29.5

Efficiency TruConvert DC1030 - discharge -

* Important electrical specifications difference in Released version.
Charge/discharge voltage range will be limited to 200-700V
Max charge/discharge current will be limited to 70A

FAQ TruConvert Series

Commissioning FAQs

Q1: *Facing communication errors?*
A1: Make sure that the RS485 cable is correctly connected from the System Control to the slave (AC or DC), the respective devices are correctly connected with each other, and the last slave or sublsave units have terminal resistors. Terminal resistors are supplied by Trumpf.

Q2: *Some devices have different software versions that lead to an error?*
A2: Synchronize both software or re-install the correct software version.

Q3: *Facing 24-V supply undervoltage?*
A3: Make sure there is enough current flow to the system. 2A are required by each DC, 8A by each AC, 250mA by each system control.

Q4: *How to connect the DCs with the battery the first time?*
A4: Either making sure that the battery is fully discharged, or when not possible, pre-charging the DCs to the voltage level before the initial connection. This is possible using a pre-charge unit. Otherwise, a resistor can be used for the initial connection to limit the instantaneous current flowing from the batteries to the internal capacitors of the DCs.

Q5: *DCs not able to operate the DC-Link independently?*
A5: Is the Voltage Static (Droop) Mode activated?

Q6: *Facing problems with the contactor?*
A6: Are the contactor cables correctly installed and the contactor coil is powered externally?

Q7: *Can 1 System Control communicate with different DCDC products like 1008 and 1010 together?*
A7: No, for each DCDC product, an individual system control must be utilized. ACDC and DCDC products can be handled together by 1 system control, as slave/sub-slave system.
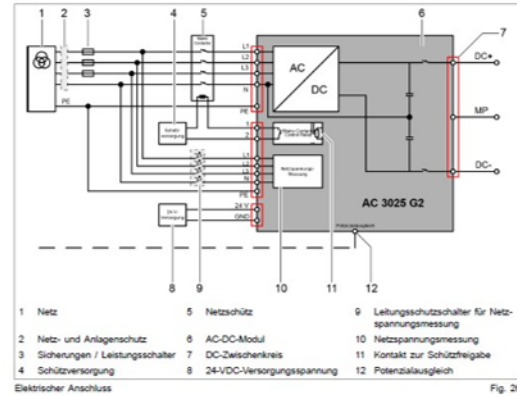
Hardware Check, frequent source of errors
• AC3025

- ## External Switch:

  - measurement wire correctly connected ?
  - Phase order L1, L2, L3 respected ?
  - Use a 4 Wire external switch ?
  - Properly fused on DC and AC side ?
  - Island mode:
    - coil of external switch driven by external Aux power ?
    - When creating an Island / microgrid with AC3025 -> Management of central earthing point correct ?
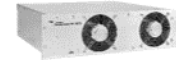

1 Netz	5 Netzschütz	9 Leitungsschutzschalter für Netz-spannungsmessung
2 Netz- und Anlagenschutz	6 AC-DC-Modul	10 Netzspannungsmessung
3 Sicherungen / Leistungsschalter	7 DC-Zwischenkreis	11 Kontakt zur Schützfreigabe
4 Schützversorgung	8 24-VDC-Versorgungsspannung	12 Potenzialausgleich

Elektrischer Anschluss   Fig. 26

Hardware Check, frequent source of errors
• AC3025

- ## Battery connection :
    - Battery fuse installed ? Right sizing and characteristic ?
    - Polarity correct ?
    - Battery DC+ and DC - isolated from earth ?
    - Insulation monitoring device-> not jeopardizing operation during start-up sequence ?
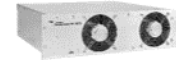
3/13/2023   Ackermann | BU PCS   2

Hardware Check, frequent source of errors
• AC3025

- ## 24V AUX Power
    - Size of conductors sufficient ?
    - Size of power supply correct (8A /per AC3025 / 2A per DC10xx) ?

- ## RS485/Ethernet connection :
    - RS485 Terminator from Trumpf ? (Otherwise Blackstart may not work)
    - CAT5 Patch cable ? Self made patch cable ?

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Hardware Check, frequent source of errors
• DC1008/DC1010

- Battery connection :
  - Battery fuse installed ? Right sizing and characteristic ?
 - Polarity correct ?

Hardware Check, frequent source of errors
• DC1030

- Battery connection :
  - Battery fuse installed ? Right sizing and characteristic ?
  - Polarity correct ?
  - Battery DC+ and DC- isolated from earth ?
  - Insulation monitoring device -> not jeopardizing operation during start-up sequence ?
  - Is a pre-charge circuit installed on Battery side ?
    Can you avoid high inrush current at first Battery connection ?
  - Is DC-Bus charged > V batt +50 V ?
  - PLUG Connection:
    Common DC-Minus respected ?
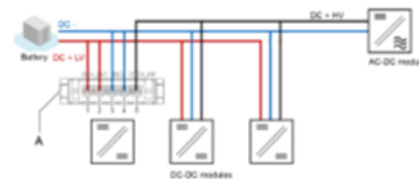
A   Schnittstelle an DC-DC-Modul   3,4   Batterie- und DC-Zwischenkreis-   5   DC-Zwischenkreisanschluss DC
                                          anschluss DC-   +_HV

1,2   Batterieanschluss DC+_LV

FAQ TruConvert Series

After Sales FAQs

Q1: *Is a supported grid-code required?*
A1: Contact the service team and you will receive the needed password to activate grid codes.

Q2: *Device giving an error during power transfer?*
A2: Error source can be extracted by Modbus or from the GUI and be compared with the register list provided by Trumpf. This can help to find the source of the error and eventually solve the problem.

Q3: *Are the devices experiencing overheating?*
A3: Make sure to have enough space between the air inlet and outlets and generally enough air flow as per described in the manual.

Q4: *Facing troubles with the AC3025 pre-charging?*
A4: Make sure to have a software version of IL14B8 or higher. Either way, contact the Trumpf Service Team.