

WHT TCS Cupboard 1 Spares

[Document link at the BSCW](#)

All [TCS spares](#) are located in the dome first floor WHT TCS cabinets.

Location of Cabinets

R1= Control room

R2= Azimuth

R3= Altitude

R4= Cassegrain Rotator & Cable Wrap

R5= Nasmyth Drive Side

R6= (Not used, left for spare parts)

R7= Prime Focus and Focus Drive

R8= Basement Twister (Drives PSU's)

R9= Submarine

In the following tables the last column contains the total number of spare units estimated to be needed during at least 10 years; the figure is in red whenever this number does not match the actual spares in hand. Of course it's a rough estimation based of previous experience or information from vendors.

Table 1 "[MODULES](#)"

Description	Spare Units (in hand)	Note	Recommended Units Long Time Term (total)
Heidenhain ROD 486 4096 SinCos Encoder	1	Encoder used in AZ & Alt M1+M2+Position Encoder Total= 6 encoders	2
Kubler Incremental encoder quadrature 8.5000.B311.5000	2	Used in all the rotators Total= 3 encoders	2
Kubler ABS encoder SSI protocol T8.5863.2221.G723 17bits ST +12Bits MT	1	Used in all the rotators and the focus driver Total= 4 encoders	2
TWK IWE250 linear ABS encoder (LVDT type)	1	Used 1 in Cass Cable wrap	1

Inducoder 16 Bits ST AWG102/EAS57-65536B-30-D-S/L120	1	Used in AZ and ALT	1
Inducoder 17 Bits Incr. EEL 58/90 6131072-05-D-R + adaptor flange and shaft	2	Can be used as replacement for Heidenhain ROD486.	0
Inducoder 12 Bits ST EAS 57-406B-30-D-R/1M	1	Used in AZ and ALT	1
Elmo servo drive	2 +1 in R6 cabinet Total=3	Used in all telescope motors Total=11 drives	5
Beckhoff CPU PLC CX5130-0115 CX2900-0028 TC1200-0040 TF6310-0040 TF6340-0040	1 with the license	Kept by Jure S/C office!	2
Beckhoff EK1100 Ethercat coupler 96.31€	1+ 1 in R6 cabinet Total=2	Used at: R2=1 R3=1 R4=1 R5=1 R7=1 R9=1	2
Beckhoff EK1110 Ethercat extension terminal 52.09€	1	Used at: Only R1	2
Beckhoff EL1008 8 digital inputs 24V DC inputs 34.40€	2 +1 in R6 cabinet Total=3	Used at: R1=10 R2=1 R3=1 R4=1 R5=1 R7=1 R9=3	5
Beckhoff EL2808 8 digital outputs 24V DC 0.5A 42.99€	2	Used at: R1=2 R9=1	2
Beckhoff EL5021 1 Channel sin/cos encoder 1Vpp/250hz/12bit 181.80 €	1	Used at: R2=1 R3=1	2
Beckhoff EL3104 4 analog input / differential +/-10V / min 200kOhm / 16 Bits 181.40€	1	Used at: R1=6	2
Beckhoff EL5101 incremental encoder 24 DC supply. max 1Mhz 184.75€	1+1 in R6 cabinet Total=2	Used at: R4=1 R5=1 R7=1	2

Beckhoff EL5002 2 channel SSI interface 24bits 1Mhz max 191.63€	1+1 in R6 cabinet Total=2	Used at: R2=1 R3=1 R4=1 R5=1 R7=1	2
Beckhoff EL2202 2 digital output / push-pull 24DC /0.5A / (DC triggered) 46.78€	1	Used at: R1=1	2
Beckhoff EL9410 Power supply terminal for E-bus, with diagnostics 47.17€	1	Used at: R1=1	2
Beckhoff EL9505 Power supply unit terminal generates an output voltage of 5 V DC from the 24 V DC input voltage 59.29€	1	Used at: R1=1	2
Beckhoff EL1252 2-channel digital input terminal with timestamping 76.65€	1	Used at: R1=1	2
Beckhoff EK1122 Ethercat Junction 73.70€	1	Used at: R9	2
Ethernet Switch 8 port Siemens Type Rail DIM 24V DC (Scalance XB008G)	0	Used at: R1=1 R9=1	1 (Model DIN rail – to be purchased by computing / Luis)

Table 2 'ELECTRIC'

Description	Spare Units (in hand)	Note	Recommended Units for Long Time Term (total)
Shunt regulator for servo drives Elmo (Dumper Resistor)	1 in R6 cabinet Type= SRST50 SRST50=2 SRST90=2	Used in all the Elmo drives Total=11 Two type of Shunt SRST50 for the rotators (50V) and focus SRST90 for the AZ and Alt drives (90V) €129 (lead-time 8 weeks)	SRST50=2 SRST90=2

Filters DPU100A/10A 100uH 44mOhm Schukat Electronic DE €4.35 (Order code DPO-10-100)	3	Used in all the Elmo driver outputs to the motors Total=11	3
AC Filtros (EM filters) Model FYK10T1-C	3	Used 6 in R8	3
PSU ABB CP CP-E 24V/10.0Amps , 240W, 24V dc Type Rail DIM	1	Used at: R1=2 and R8=3 RS: 668-0924 €169	1
PSU ABB CP CP-E 48V/10.0Amps, 480W, 48V dc, Rail DIM	1	Used in R8 for NS rotators 1 can act as spare. RS: 668-0930 €276	1
CM-PVE Phase Monitor for Over & Under Voltage	1	Used 1 in R1 RS: 442-9427 €65	1
3 Phase mains filter Schurter FMAC- 0991D-3610, RFI, 36A, 480 V ac, 60Hz	1	Used 1 in R8 RS: 708-5673 €108	1
Circuit Breaker ABB B6 S201 1 Pole (Note: Electrical dep. has plenty of all these circuit breakers' equivalent units in house)		Used: 1	1
Circuit Breaker ABB C2 S201 1 Pole	2	Used: 12	2
Circuit Breaker ABB C4 S201 1 Pole	2	Used: 4	2
Circuit Breaker ABB C6 S201 1 Pole	2	Used: 4	2
Circuit Breaker ABB C6 S203 3 Pole		Used: 4	2
Circuit Breaker ABB C10 S201 1 Pole	2	Used: 5	2
Circuit Breaker ABB C10 S202 2 Pole	1	Used: 1	1
Circuit Breaker ABB C25 S202 2 Pole		Used: 1	1
Circuit Breaker ABB C40 S204 4 Pole		Used: 1	1
Circuit Breaker ABB D32 S203 3 Pole		Used: 1	1
Contactora ABB AF12Z-30-10-21, Contactora, 12.5 A, Rail DIN, 690 V, 3PST-NO, 3 Poles, 5.5 kW	1	Used 6 Farnell: 2564894 €62	1
Relay ABB NF44E-13	0	Used 4 Onlinecomponents.com \$58	2

Relay ABB CR-P024DC2 2c/o, 8A, 24Vdc	10+15=25	Used: >50 RS: 680 3849 €2.47	15
Relay PT570024 Schrack 24V 6A/250V	1	Used: 8 RS: 334 0020 €9.11	6
Socket ABB CR-PLSx	3+15=18	Used: >50 RS: 775 5218 €4.85	15
Socket YPT78704 Schrack	1+6=7	Used 8 RS: 511 7018 €7.49	6
Terminals rail DIM 2.5mm	60	Various colors	60
Terminals rail DIM 1.5mm	60	Various colors	60
Terminals double rail DIM	~20		20
Terminals rail DIM earth	~20		20
Contact block NO EATON M22-K10	10	Used: 72 RS: 399-3573 €3.40	10
Contact block NC EATON M22-K01	10	Used: 15 RS: 399-3551 €3.40	10
Push button +/- EATON M22-DDL-S-X4/X5	1 in R6 cabinet +5=6	Used: 12 RS: 110-4557 €15.33	5
Key switch EATON S-TO-SOND	1	Used: 4 RS: 257-9665 €38.0	1
LED indicator EATON 85-264Vac W	5	Used: 8 RS: 399-3731 €11.74	5
LED indicator EATON 12-30Vdc G	2+3=5	Used: 9 RS: 399-3652 €5.99	3 Received
LED indicator EATON 12-30Vdc R	5	Used: 2 RS: 399-3652 €5.99	5 Received
LED indicator EATON 12-30Vdc W	6	Used: 4 RS: 399-3630 €5.99	5
LED indicator yellow EMAS KIS-01 Y (EMAS is a Czech company; unique supplier)	5	Used: 12 Czech crown 132 approx €5.13	5
LED indicator green EMAS KIS-01 G	3	Used: 19 Czech crown 132 approx €5.13	5

LED indicator red EMAS KIS-01 R	5	Used: 8 Czech crown 132 approx €5.13	5
LED indicator white EMAS KIS-01 W	2	Used: 5 Czech crown 132 approx €5.13	5
Push buttons/holders M22 EATON:			
Green maintained (illum)	5	Used: 9 RS: 446-5322 €16.27	5
Black maintained	5	Used: 8 RS: 141-7698 €11.27	5
Black momentary	5	Used: 8 RS: 847-5143 €4.66	5
White momentary	5	Used: 7 RS: 399-2946 €10.42	5
Yellow maintained (illum)	3	Used: 3 RS: 454-8506 €22.16	3
Yellow LED holder	3	Used: 1 RS: 847-5180 €6.50	3
White LED holder	5	Used: 5 RS: 847-5187 €6.50	5
- Red LED holder	3	Used: 2 RS: 847-5178 €4.85	3
- Acoustic indicator	2	Used: 4 RS: 468-5756 €25.66	2
Mains switches Schrack IN8E2-332	0	Used 3 (Note: Electrical dep. has equivalents units in house)	1
Mains switches Schrack IN8E2-435	0	Used 2 (Note: Electrical dep. has equivalents units in house)	1
Mains switches Schrack IN8E2-437	0	Used 1 (Note: Electrical dep. has equivalents units in house)	1
Over voltage protection BR0 Saltek FLP-12,5V/4	0	Used 4 in R1 https://www.saltek.eu (Can be bought locally from other manufacturers)	1

Converter Phase Failure Monitor OEZ model Varius OPVP10-3	0	Used 1 R1 (Can be bought locally from other manufacturers)	1

R6 Telescope Nasmyth cable wrap box cabinet.

P4 Telescope Nasmyth cable wrap panel.

Both R6 & P4 not used now because instrument WEAVE and they can be used like spare for others focal stations.

For components list see the next photos.

Cabinet P4		
Manual control unit NCW (Nasmyth Cable Wrap Side)		
<i>Identification</i>	<i>Name</i>	<i>Description</i>
Q0	Breaker	Supply 24VDC for PC2100, buttons and LED indicators
P4PC	B+R	Panel PC2100, 10,1", supply 24VDC
X-24V	Terminals	Power supply 24VDC for -P4PC, for buttons and LED indicators
S1, S2	Push button	Double push button, manual control of NDS+ and NDS-
S3, S3'	Switch	Two position switch, LOCAL or REMOTE control
S4	E-stop	Emergency Stop button
S5	Push button	Acknowledge button
B1	Buzzer	Sound signalization

Figure 1 Cabinet P4



Figure 2 Cabinet P4



Cabinet R6 Nasmyth Cable Wrap Side

<i>Identification</i>	<i>Name</i>	<i>Description</i>
AC6	Beckhoff	I / O modules of the control system
F1	Breaker	Power supply 50VDC for Servodriver U1 Elmo
K1	Relay	Switch ON supply 24VDC, to unbrake motor M1 via Elmo Digital Output
KA1	Relay	Relay is switched ON when =TEL+NCW-LS1, Limit switch + is not reached
KA2	Relay	Relay is switched ON when =TEL+NCW-LS1, Limit switch - is not reached
Q1	Breaker	Power supply 24VDC for brake +NCW-BR1, motor M1
Q2	Breaker	Supply 24VDC for Elmo electronics,Beckhoff, ABS encoders, switches
SR1	Shunt	Shunt regulator for servo drives Elmo
U1	Elmo	Servo drive for motor M1 control
X-50V	Terminals	Power supply 50VDC for Servo driver Elmo
X-AD2	Terminals	Supply 24VDC for absolute encoder +NCW-ABS1
XB-24V	Terminals	Power supply 24VDC for brake
XB-24V	Terminals	Power supply 24VDC for break of the motor
XC-24V	Terminals	Supply 24VDC, signals of safety loop and interlock circuits
X-DI	Terminals	Signals 24VDC, switches, digital inputs
XM	Terminals	Power supply 50VDC for motor
XT	Terminals	Signal from tacho

Figure 3 Cabinet R6

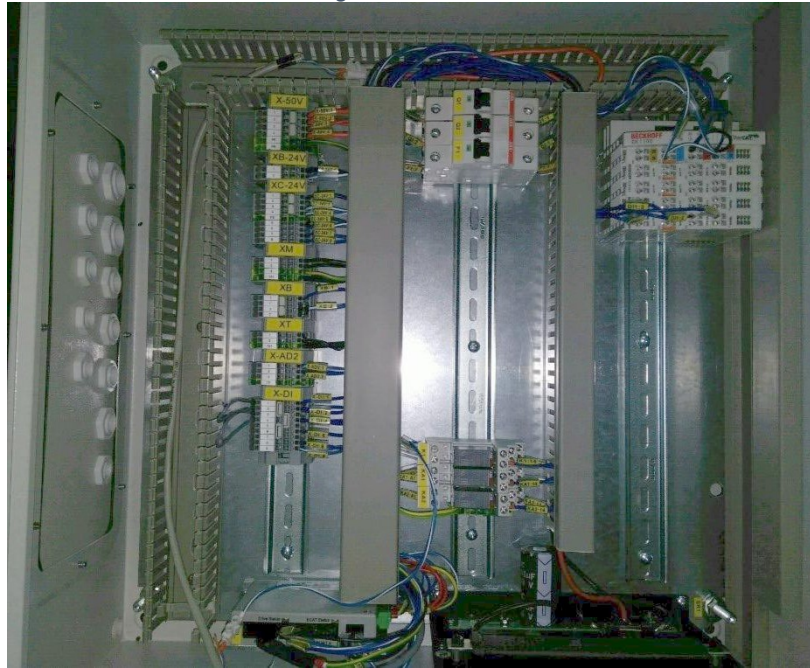


Figure 4 R6 Cabinet Relays and PLC Modules

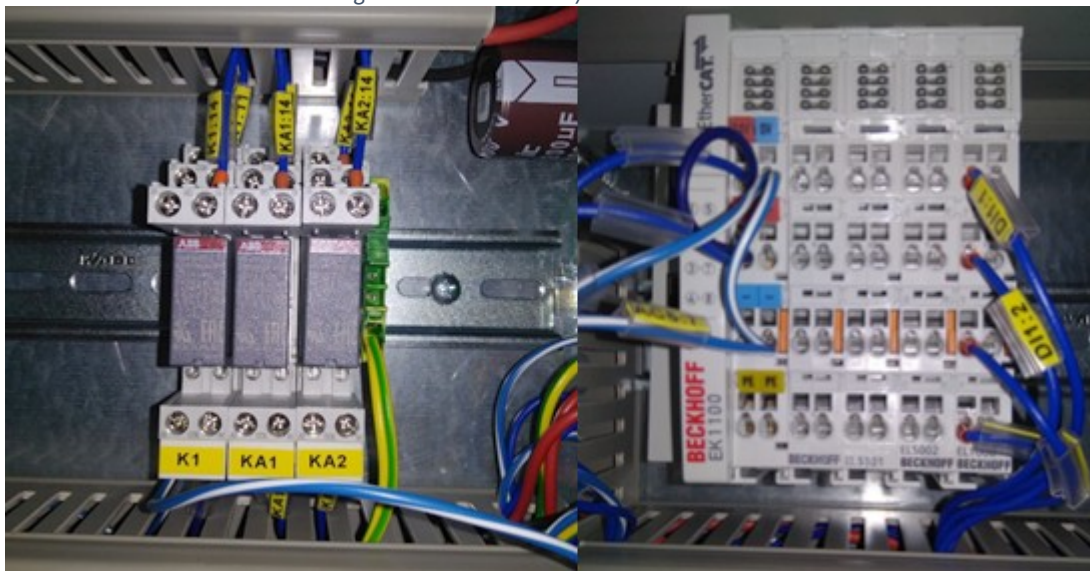


Figure 5 R6 Cabinet Damper Resistor

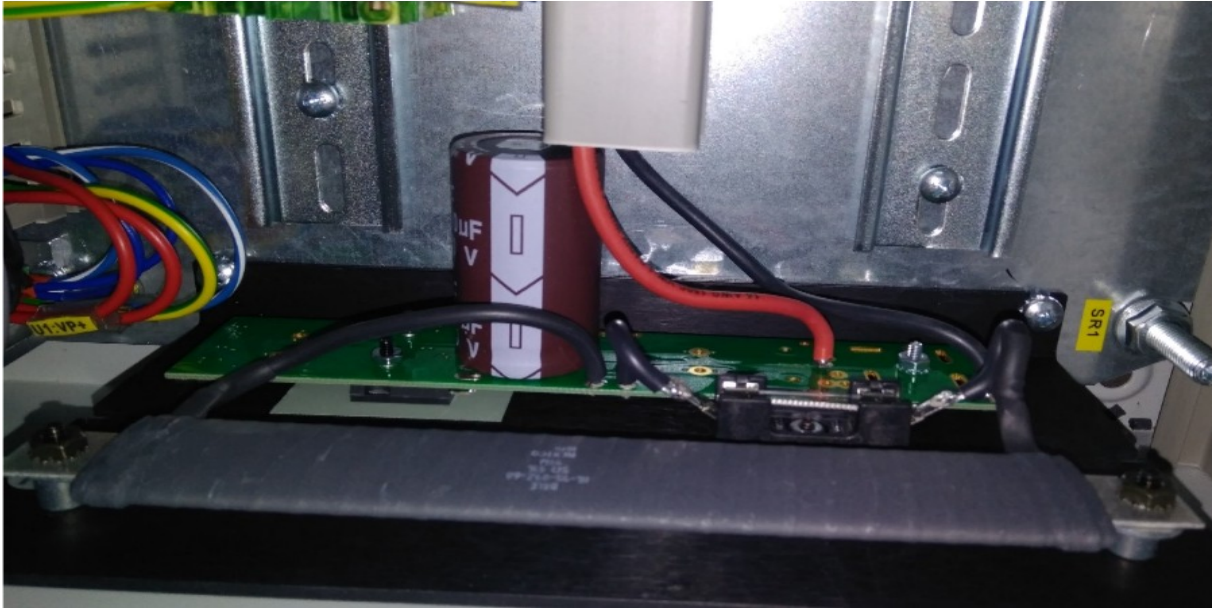
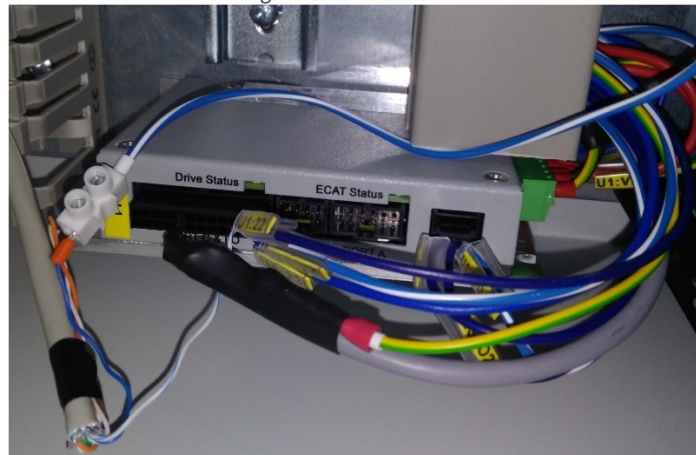


Figure 6 R6 Elmo Driver



Manuals and Datasheets:

<https://bscw.ing.iac.es/bscw/bscw.cgi/985507>

Revision Note:

- During November new components arrived, I updated the spares and new order was placed. 14/11/2018 Carlos
- Document updated by Carlos 04 June 2019
- Document updated by Renee 11 Sept 2020 and published on T&I spares web page in .pdf format

