Original instructions

BG00309679 en-US C.001.1 2015-08-20

Radio control HBC 727

SANDVIK

⚠ WARNING	
	**IGNORING INSTRUCTIONS HAZARD!** **To avoid death or injury you MUST read, understand and follow operator's and maintenance manuals before installing, inspecting, operating, servicing, testing, cleaning, transporting, storing, dismantling or disposing of the product or a part or accessory of the product. Keep this publication for future reference.**

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1 INTRODUCTION

1.1 The Purpose of these instructions

This manual contains supplementary information for operation, maintenance and repair of a component.

Before operating, or performing maintenance or repair procedures for the component or system described in this manual, read and understand the information in operator´s and maintenance manuals supplied with the machine. Pay special attention to the safety information in chapter "2 Safety and environmental instructions" of those manuals.

1.1.1 Validity of the manuals

This manual, and especially the safety information, is valid only if no unauthorized changes to the product are made.

Continuing improvement and advancement of product design might have caused changes to your product which are not included in this publication. Note also that if a third party has made changes to the product after delivery from the manufacturer, this publication does not include information on these changes or their influences on the product.

Whenever a question arises regarding your product, or this manual, please consult your local Sandvik representative for the latest available information.

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2 SAFETY AND ENVIRONMENTAL INSTRUCTIONS

2.1 Safety

The operator must have sufficient knowledge of this function before attempting to control the rig via the radio controller.

To avoid death or injury you MUST read, understand and follow operator's and maintenance manuals. Read the operating instructions carefully and ensure that you understand everything fully.

Keep the operating instructions in a place where they are readily accessible.

⚠ DANGER	
 	**CRUSHING HAZARD!** **Unexpected rig movements will cause death or severe injury.** **Only personnel with adequate training are permitted to use the radio transmitter.** **Make sure nobody is in the rig's hazard zone.** **Select a safe location for radio control, from which you have a good and complete view of the working movements of the rig and the surrounding working conditions.** **If necessary, arrange monitoring of the blind area.**

WARNING! CRUSHING AND IMPACT HAZARD!
Incorrect radio-control use could cause personal injury or damage to property.
In the event of a hazardous situation and with all faults, press the fast stop button on the transmitter.
Only operate the radio system when it is in perfect working order.

Remain vigilant when working with the radio system and familiarize yourself with its functions. This applies in particular if you are working with it for the first time or if you work with it only occasionally.

Check the function of the fast stop each time before starting work. When you press the fast STOP switch with the transmitter on, the status LED of the transmitter has to go out. If the status LED does not go out then you have to disable the radio control system immediately. Remove the battery and the iON-key from the transmitter and inform a service technician.

If the radio transmitter does not operate correctly, switch off the radio transmitter. Faults and defects that could influence safety must be fixed by specialists who have been trained and authorized by Sandvik.

Use original replacement parts and accessories (e.g. rechargeable batteries) exclusively; otherwise it is possible that the equipment safety can no longer be guaranteed and extended warranty will be voided.

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Make sure that there are no radio transmitters operating at the same frequency in the same area.

Always switch off the radio transmitter when it is not needed. Do not leave the radio transmitter anywhere where it might fall into the wrong hands. This applies in particular if you change location, when working without radio transmitter, during breaks and at the end of work. Always safeguard the radio transmitter against use by unauthorized persons, for example by locking it away.

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3 DESCRIPTION OF RADIO CONTROL

3.1 Description of radio control

The radio control system consists of the remote control (radio transmitter, TRM) (1) and the radio receiver (REC) (2).

The safety of the system is ensured by assigning each system an individual address code. The receiver cannot be controlled by any other radio system.

The system with an operating range 2402-2480 MHz, operates in what is termed the general frequency range. The transmission power of the system's transmitter is below 100 mW.

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4 USE

4.1 Use

For information about the functions and operation of the remote-control unit's controls, refer to the operator's manual for the drilling rig.

Always use the carrying belt when using the remote control.

1. Insert a fully charged battery (1) into the battery compartment. The remote control is powered by this battery.
2. If necessary, release the stop button (2), by turning it clockwise.
3. Press the ON button (3) twice: first, click it quickly and after 0,5 -3 seconds press and hold it until the indicator light turns green. The green LED indicates that the remote control is ready for use (the LED blinks slowly). If the LED blinks quickly, there is no radio connection with the receiver.
4. Switch the remote control off by pressing the OFF button (4).

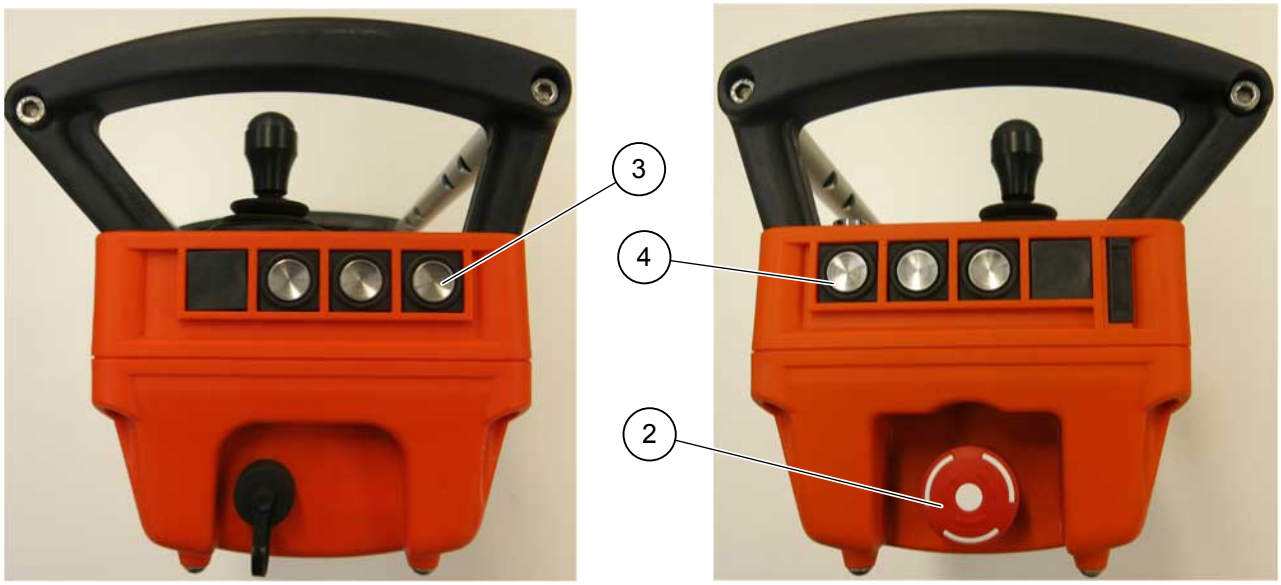
4.2 Starting the rig after the fast stop button has been pressed

If the rig has been stopped with the fast stop button, proceed as follows:

1. Release the stop button (2) by turning it clockwise.

2. Press the ON button (3) twice: first, click it quickly and after 0,5 -3 seconds press and hold it until the indicator light turns green. The green LED indicates that the remote control is ready for use (the LED blinks slowly). If the LED blinks quickly, there is no radio connection with the receiver.

Note! ***Use the OFF switch (4) whenever you wish to switch off the remote control. Do not use the fast stop button for this purpose!***



4.3 Low battery voltage

If the LED (H20) on the remote control turns red, the remote control's battery must be replaced. See the 'Battery and charger' section.

If the battery is not replaced, the remote control disconnects the transmission automatically.

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5 CABLE CONTROL

5.1 Cable control

With a cable you can generate a direct data connection between the transmitter and receiver. The radio transmission is disabled. At the same time, the power supply of the transmitter is provided through the cable, as well.

5.2 Connecting the cable

1. Switch the transmitter off.
2. Remove the battery. **NOTE: The cable connection works only without battery.**
3. Remove the screw lock on the transmitter.
4. Connect the transmitter and the receiver with the cable.

   Ensure that the connector is locked.

5. Switch the transmitter on.

Notes:

- If you connect the cable while working with the system, it will switch off automatically. Actuate the start button to switch to cable operation.
- When the system is in cable mode the transmitter will receive the supply voltage from the receiver, i.e. the transmitter can be used without the battery.
- If you disconnect the cable from the transmitter and receiver, the system will switch off automatically. Actuate the start button to switch back to radio operation.

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6 iLOG ELECTRONIC KEY

6.1 iLOG electronic key

The transmitter is equipped with an electronic iLOG key. iLOG key contains all the data required for operating the transmitter. Operation is not possible without iLOG key!

iLOG key can also be used for operation of replacement transmitters of identical construction.

6.2 Transferring the iLOG electric key to another remote control

1. Remove the iLOG electric key by pulling it out.
2. Attach the iLOG electric key to another remote control by inserting it and pushing in.

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7 BATTERY AND BATTERY CHARGER

7.1 Battery and battery charger

1 *Battery*
2 *Battery charger*
3 *LEDs for indicating actual operating state of the battery*

7.2 Battery

The battery capacity depends on the age of the battery and the ambient temperature. Older batteries lose their capacity over time. The battery capacity diminishes more quickly at temperatures below 0 °C (32 °F) and above 40 °C (104 °F).

Note:

- Charge the battery fully before initial use and/or after storing for longer than 6 months. When doing so note that the battery will only reach its full capacity after 3-5 charge cycles (complete charging and discharging).
- Only use the associated HBC charger to charge the battery.
- Charge the battery at an ambient temperature of 0-40 °C (32-104 °F).
- Recharge the battery only when the status LED on the transmitter flashes red and the acoustic signal sounds.
- Charge the battery fully before storing it for a prolonged period. Otherwise total discharge may occur.
- Always store rechargeable batteries at room temperature.
- Protect the battery from short circuits and always store it in the protective cover provided.

When handled properly the battery can exceed 500 charging cycles.

7.3 Battery charger

Ensure that you observe the following instructions:

- Use this charger only to charge the batteries specified on the type plate.
- The charger may not be used in hazardous areas.
- The charger has to be operated with the voltage indicated on the back.
- The charger has to be used in vehicles or indoors only.
- Use the charger only within the specified temperature range.
- Protect the charger against heat, dust and humidity.
- Do not cover the charger while it is in use.
- Disconnect the charger from the power supply when it is not in use.
- In case of any fault of the charger or the connecting cable disconnect it immediately and put it out of operation.
- Do not make technical changes to the charger or the connecting cable.
- Defects must be repaired by qualified personnel only.

7.4 Charging the battery

The charger is supplied with a connecting cable with a matching power plug.

1. Connect the charger via the connecting cable to the power supply.

2. Insert the battery into the compartment.
   Charging will start automatically.

Three LEDs indicate the actual operating state of the battery.

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1 *Green LED illuminates when battery is charged.*
2 *Orange LED illuminates when battery is charging.*
3 *Red LED illuminates when battery is deep discharged or defective.*

Note:

If a deep discharged battery is inserted into the charger, the red LED will illuminate for a few seconds before charging is started (orange LED illuminates).

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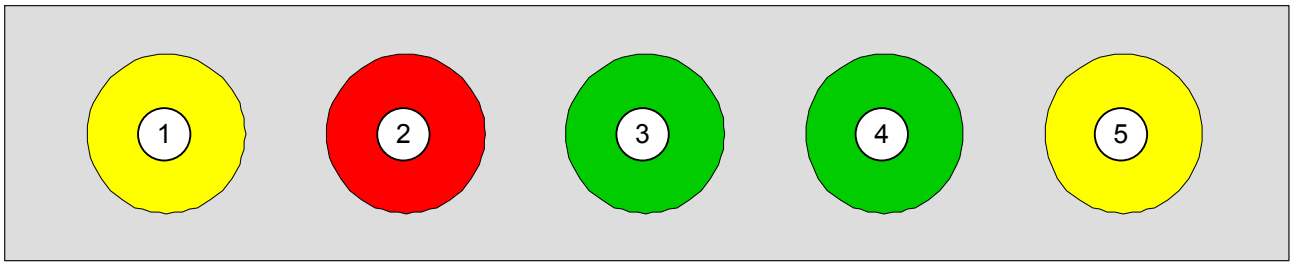
8 RADIO RECEIVER

8.1 Radio receiver

Radio receiver (REC) processes received commands from the transmitter, and performs actions accordingly.
The location of the receiver is rig-specific.
The display panel can be used for monitoring the status of the functions, operating voltage, etc.

8.2 Receiver's display panel

The control display with LEDs indicating the operating state of the radio system is located behind the inspection window of the receiver cover lid.



The LEDs have the following significance:

1	On (yellow)	Illuminates as soon as an operating voltage is present at the receiver, i.e. the connection to the machine electronics is established and operating voltage is present.
2	RF (red)	Illuminates whenever the transmitter is switched off. It will be extinguished the very moment a signal is received by the receiver on its radio frequency.
3	Si 1 (green)	Illuminates after the transmitter is switched on, the emergency stop circuit is not active and the receiver has identified its specific transmitter.

4	Si 2 (green)	Illuminates when using functions which cause movements
5	Feedback (yellow)	Illuminates whenever the receiver is sending a feedback telegram to the transmitter.

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9 TROUBLESHOOTING

9.1 Transmitter

Before troubleshooting, check whether the system can be operated via the cable!

Problem	Possible fault	Check
Transmitter control does not react when switched on.	The transmitter doesn't have sufficient operating voltage.	Check the condition of the battery terminals. Place a fully charged battery in the battery compartment. Charge the battery.
The red low operating voltage indicator activates after a short operating time.	The condition of the battery terminals is impaired. The battery is empty. The battery is damaged.	Check the condition of the battery terminals. Ensure that the charger charges the battery properly. Check the condition of the remote control by replacing a fully charged battery in the battery compartment.

9.2 Receiver

Problem	Possible fault	Repair suggestion
The drilling rig to be controlled does not respond to the control commands.	The receiver receives no operating voltage. **NOTE!:** Observe the receiver's display panel/refer to the instructions. No radio connection between the transmitter and receiver. Observe the display panel.	Check the connection cable and connections. Check the transmitter's fuse. Check that the receiver's display panel LEDs operate correctly.
Some of the commands are not working.	The transmitter's control switches are damaged.	Check the connections and tighten the screw joints. Contact the service division, if necessary.

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Original instructions

BG00245302 A.001.1 2014-06-24

Electrical drawings; reading and symbols

Electrical drawings; reading and symbols

⚠ WARNING	
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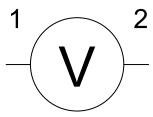
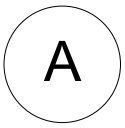
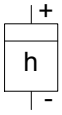
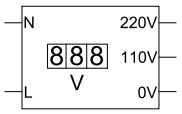
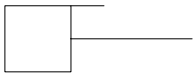
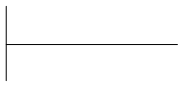
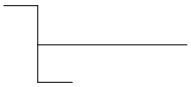
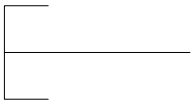
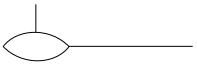
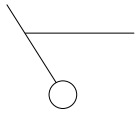
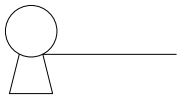
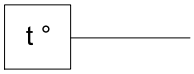
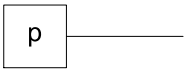
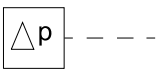
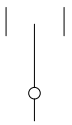
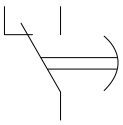
2 INSTRUCTIONS

2.1 Symbols

	voltmeter		ammeter
	hour meter		digital volt meter
	control by flow		manual operated control
	emergency switch		operated by turning
	operated by pushing		control by fluid level
	operated by lever		operated by key
	control by temperature		operated by pressure
	operated by pressure differential		make contact
	break contact		change over break before make contact
	two-way contact with center-off position		make change-over contact delayed when reclosing

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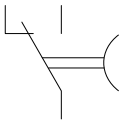
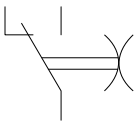
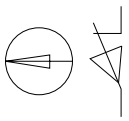
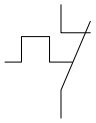
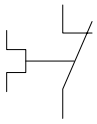
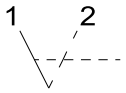
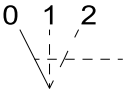
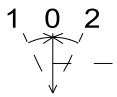
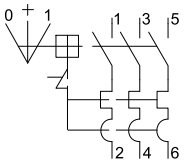
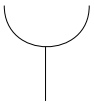
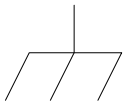
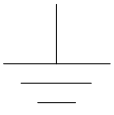
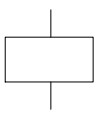
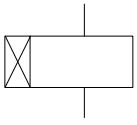
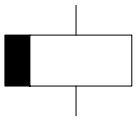
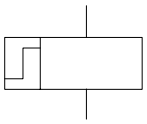
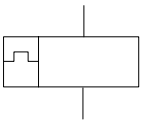
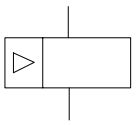
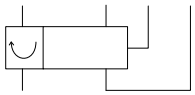
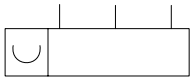
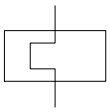
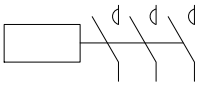
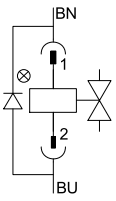
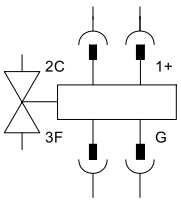
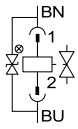
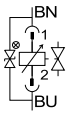
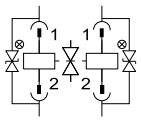
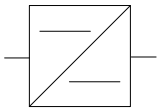
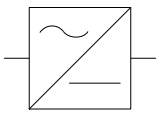
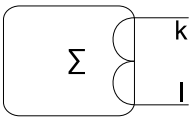
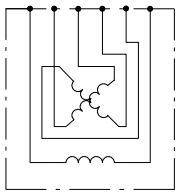
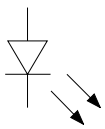
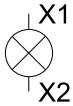
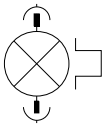
Electrical drawings; reading and symbols

	make change-over contact delayed when closing		make change-over contact delayed when closing and reclosing
	position switch, make contact, mechanically operated in both directions		position switch with positive opening operation of the break contact, mechanically operated in both directions
	self operating thermal switch, break contact		contact of a thermal relay
	circuit breaker		limit switch, make contact
	multi-position switch, two positions, locking positions		multi-position switch, three positions, locking positions
	multi-position switch, automatic return to middle position		three phase circuit breaker
	terminal		plug
	socket		slip ring unit
	junction of conductors		crossing wires (no connection)
	frame chassis		earth ground
	operating device of relay (relay coil)		relay coil of a slow-operating relay

Electrical drawings; reading and symbols

	relay coil of a slow-releasing relay		step relay
	signal relay		thermistor relay
	phase sequence relay with aux.power		phase sequence relay
	actuating device of thermal relay		contactor
	solenoid valve		proportional solenoid valve
	valve with signal light and protection unit		proportional valve with signal light and protection unit
	direction valve with signal light and protection unit		DC converter
	rectifier battery charger AC/DC converter		current transformer
	resolver		led
	signal lamp		beacon

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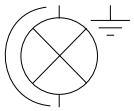
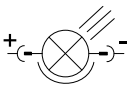
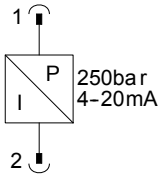
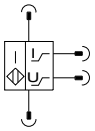
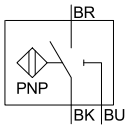
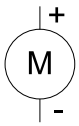
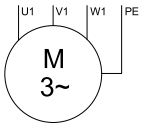
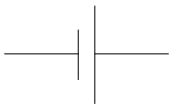
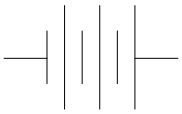
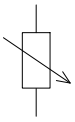
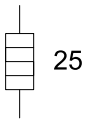
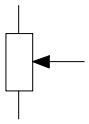
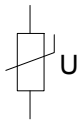
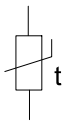
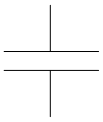
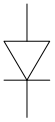
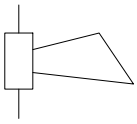
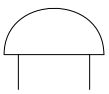
	working light		positioning laser
	pressure transducer		linear sensor
	proximity switch		generator
	dc motor		three phase induction motor
	battery (accumulator) or primary cell		battery (accumulator) or primary cells
	resistor		variable resistor
	heating resistor		resistor with sliding contact (potentiometer)
	voltage depended resistor varistor		thermistor sensor
	capacitor		diode
	inductor coil winding choke		fuse
	horn		buzzer

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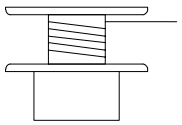
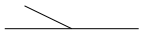
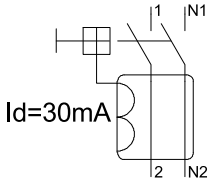
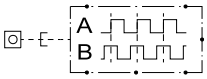
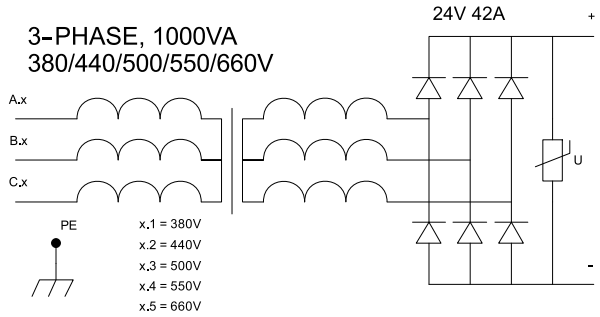
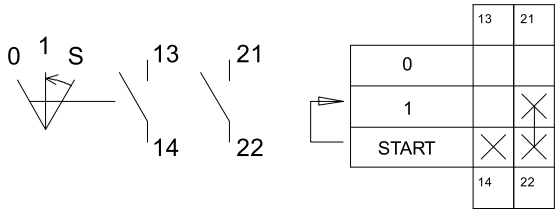
Electrical drawings; reading and symbols

	cable reel		cross-reference, position from which the line continues / position to which the line continues
	fault current protection switch		rotary encoder

	three phase transformer with three phase rectifier (example)
	switch with start contact

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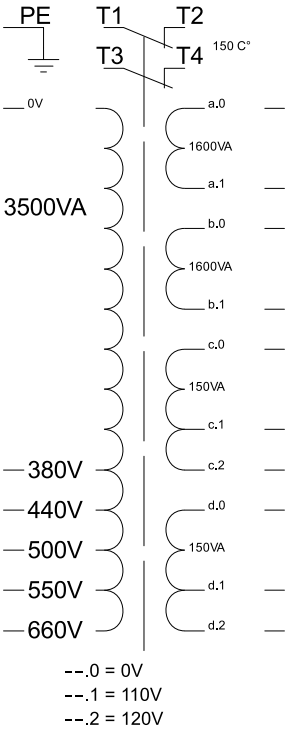
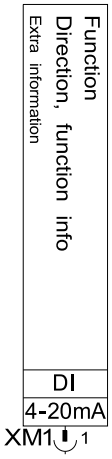
Electrical drawings; reading and symbols

	transformer (example)
	Can module contact Signal types: DI = digital input DO = digital output AI = analog input PWM = pulse width modulated FB = feedback GND = ground REF = reference voltage

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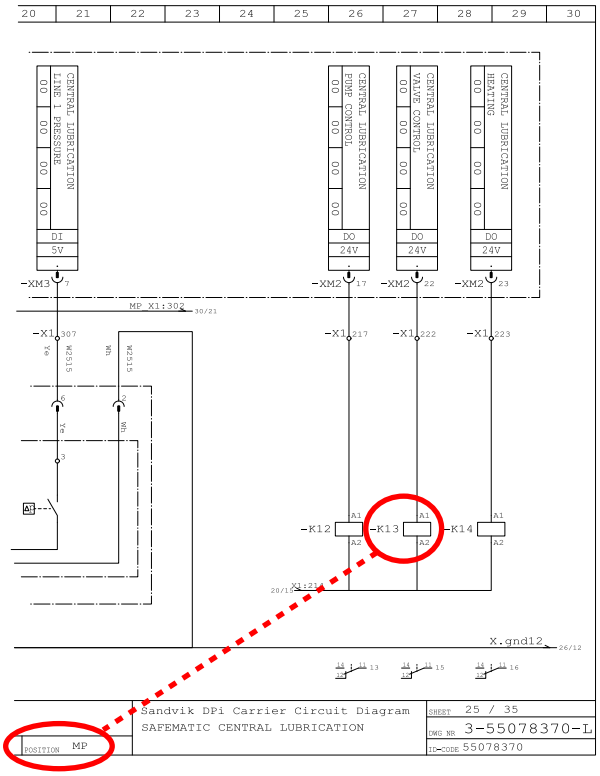
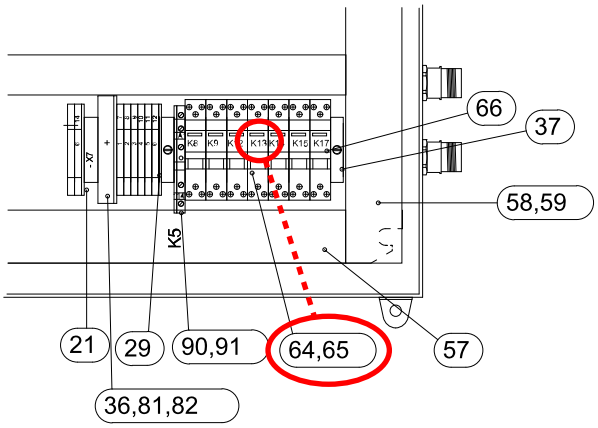
2.2 Searching of spare part items using the schematics

1. Find the needed component using the schematics. (In this example the relay K13 has to be replaced.)

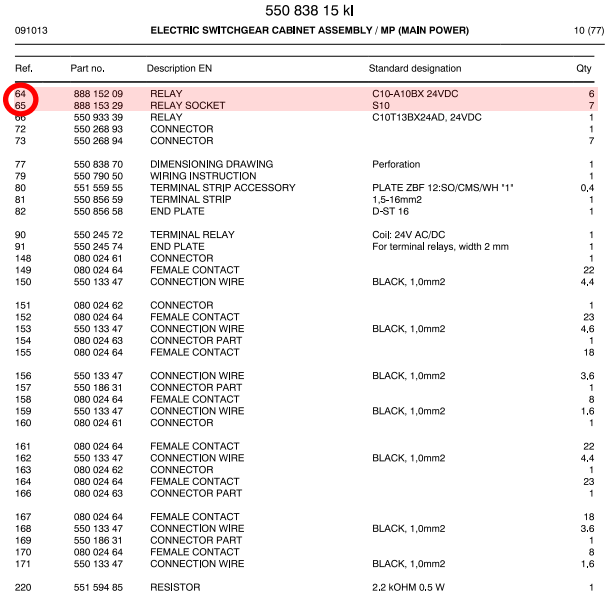


2. Find the location of the component from the Position field.
   The relay K13 is located in electrical cabinet MP.
3. Find the relay K13 from MP's layout picture.



4. Find the reference number(s) of the K13 relay. (The reference number is the same for the other similar relays.)
   K13's reference numbers are 64 and 65.

5. Find the reference number(s) from the parts list.



550 838 15 kl

091013 **ELECTRIC SWITCHGEAR CABINET ASSEMBLY / MP (MAIN POWER)** 10 (77)

Ref.	Part no.	Description EN	Standard designation	Qty
64	888 152 09	RELAY	C10-A10BX 24VDC	6
65	888 153 29	RELAY SOCKET	S10	7
66	550 933 39	RELAY	C10T13BX24AD, 24VDC	1
72	550 268 93	CONNECTOR		1
73	550 268 94	CONNECTOR		7
77	550 838 70	DIMENSIONING DRAWING	Perforation	1
79	550 790 50	WIRING INSTRUCTION		1
80	551 559 55	TERMINAL STRIP ACCESSORY	PLATE ZBF 12:SO/CMS/WH *1*	0,4
81	550 856 59	TERMINAL STRIP	1,5-16mm2	1
82	550 856 58	END PLATE	D-ST 16	1
90	550 245 72	TERMINAL RELAY	Coil: 24V AC/DC	1
91	550 245 74	END PLATE	For terminal relays, width 2 mm	1
148	080 024 61	CONNECTOR		1
149	080 024 64	FEMALE CONTACT		22
150	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	4,4
151	080 024 62	CONNECTOR		1
152	080 024 64	FEMALE CONTACT		23
153	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	4,6
154	080 024 63	CONNECTOR PART		1
155	080 024 64	FEMALE CONTACT		18
156	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	3,6
157	550 186 31	CONNECTOR PART		1
158	080 024 64	FEMALE CONTACT		8
159	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	1,6
160	080 024 61	CONNECTOR		1
161	080 024 64	FEMALE CONTACT		22
162	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	4,4
163	080 024 62	CONNECTOR		1
164	080 024 64	FEMALE CONTACT		23
166	080 024 63	CONNECTOR PART		1
167	080 024 64	FEMALE CONTACT		18
168	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	3,6
169	550 186 31	CONNECTOR PART		1
170	080 024 64	FEMALE CONTACT		8
171	550 133 47	CONNECTION WIRE	BLACK, 1,0mm2	1,6
220	551 594 85	RESISTOR	2,2 kOHM 0.5 W	1

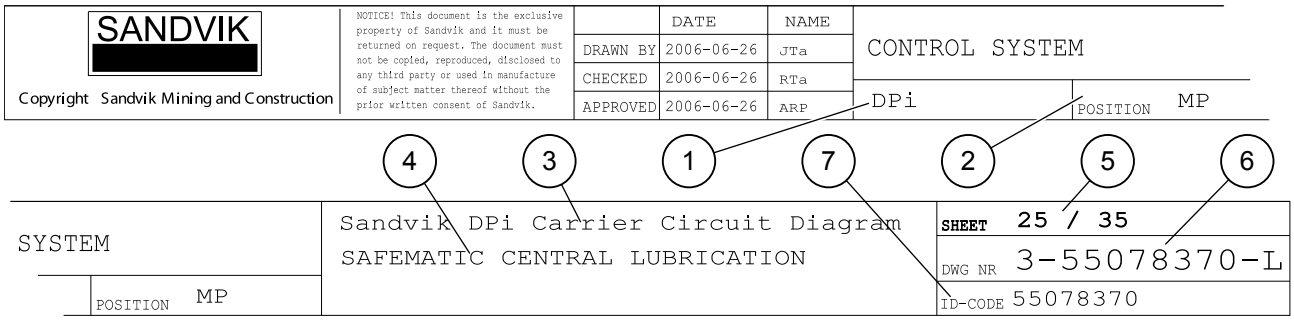
K13 relay's part number is 888 152 09 and the relay socket's part number is 888 153 29.

2.3 Wire color abbreviations

Color	Abbreviation
Black	BK
Brown	BN
Red	RD
Orange	OG
Yellow	YE
Green	GN
Blue	BU
Violet	VT
Grey	GY
White	WH
Pink	PK
Turquoise	TQ

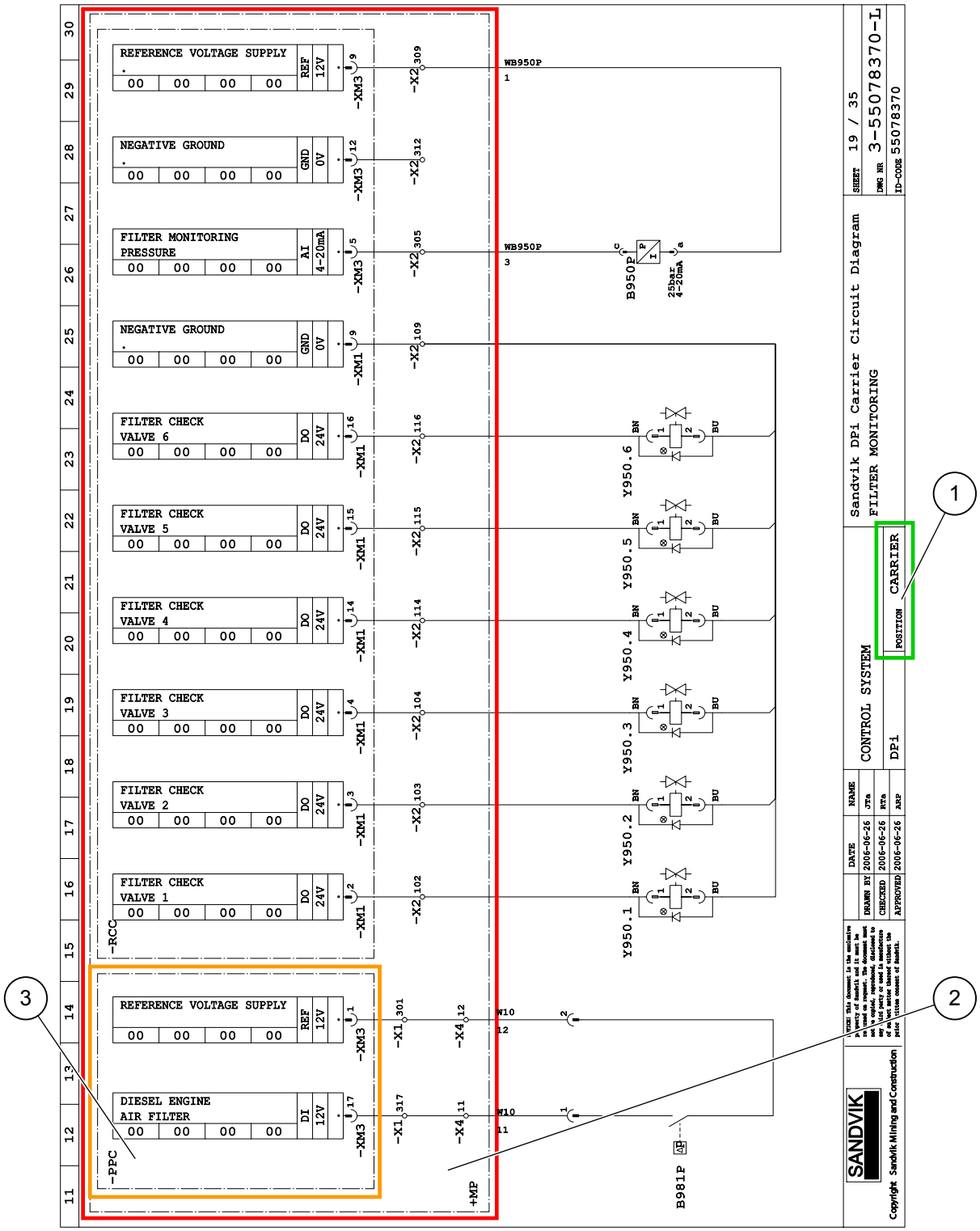
2.4 Identification marking of drawing sheets

DescriptionsField descriptions



1	DPi	Name of the equipment
2	Position : MP	Default position of a component on page
3	Sandvik DPi Carrier Circuit Diagram	Drawing name
4	SAFEMATIC CENTRAL LUBRICATION	Page name
5	Sheet 25/35	Page/amount of pages
6	DWG NR 3-55078370-L	Drawing number - Revision
7	ID-Code	ID-Code: refers to drawing number

Components in the main units



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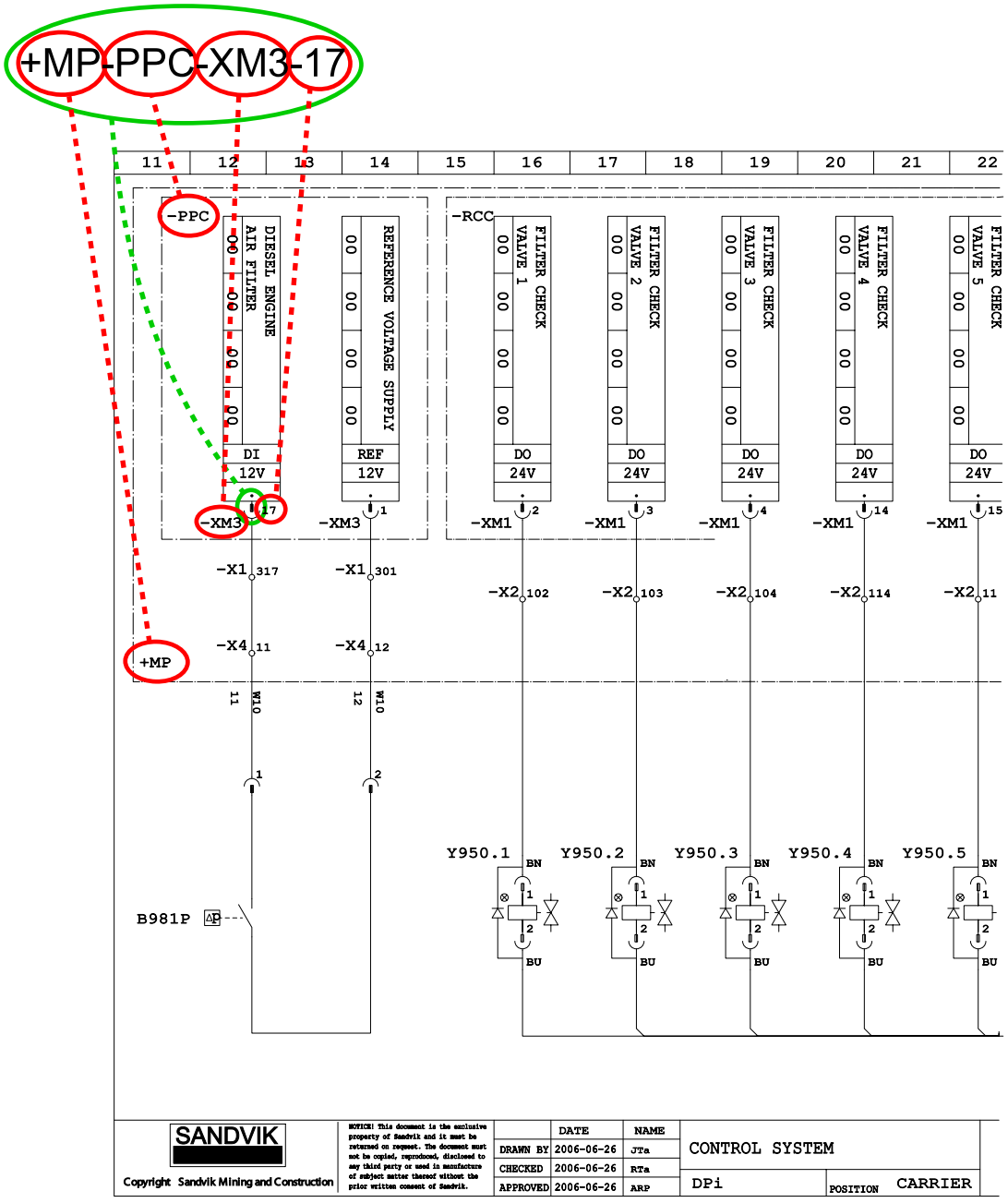
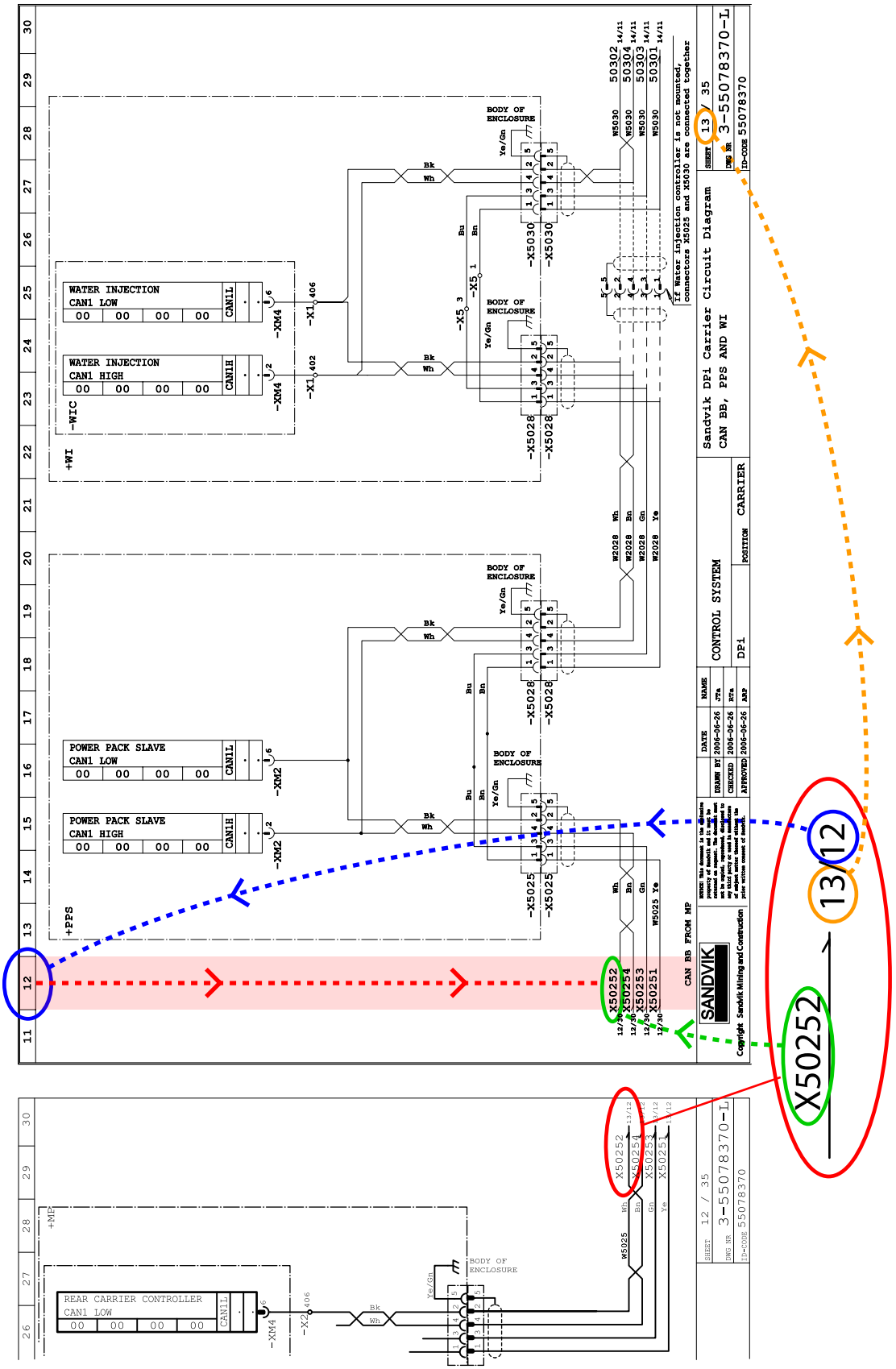
1	CARRIER	The default location (in the rig) of the components on this sheet.
2	+MP	The component is inside of the MP unit.
3	-PPC	The component is inside of the PPC component (which is inside of the MP unit).

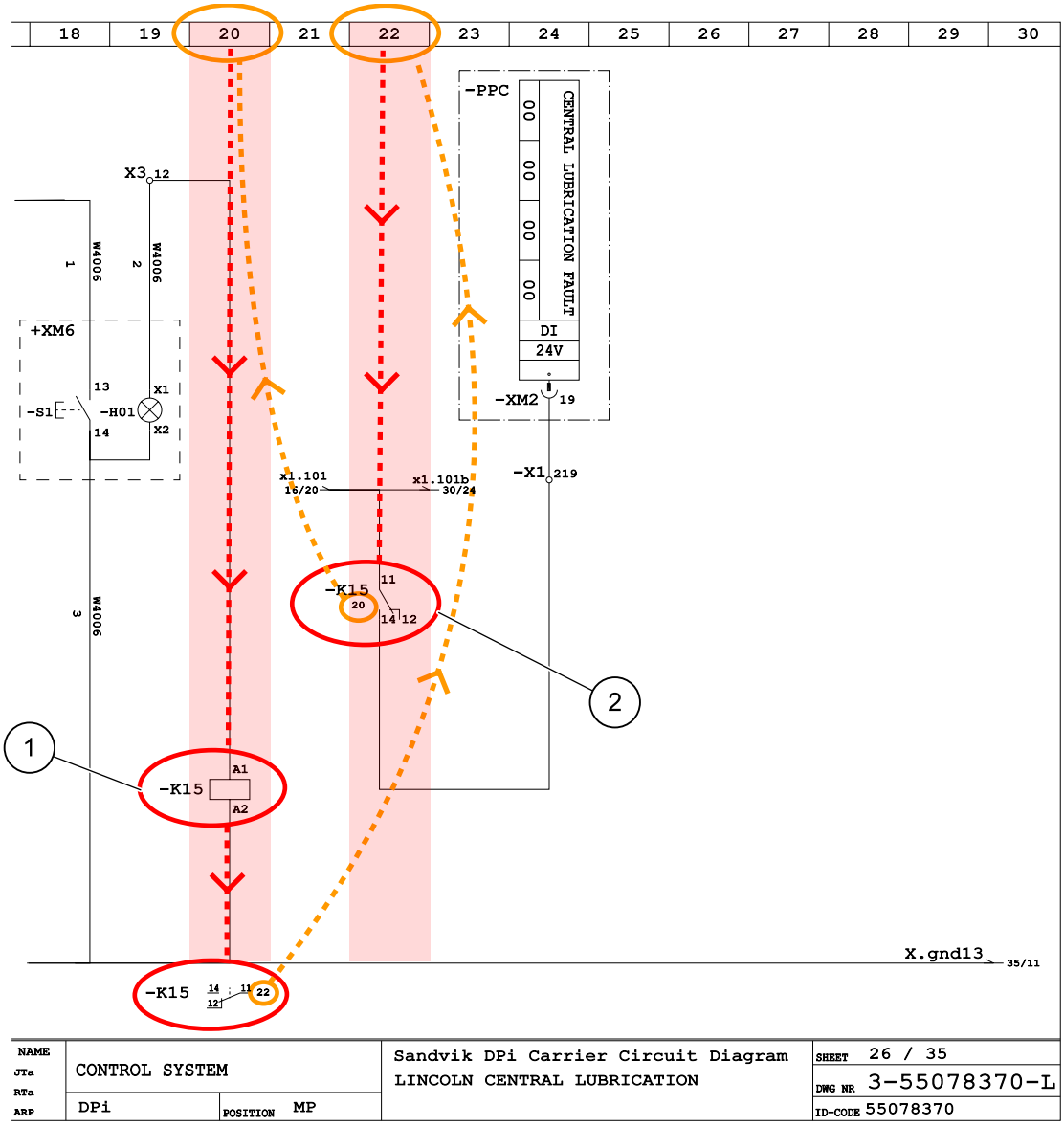
Forming the name of a connector pin



Cross-references



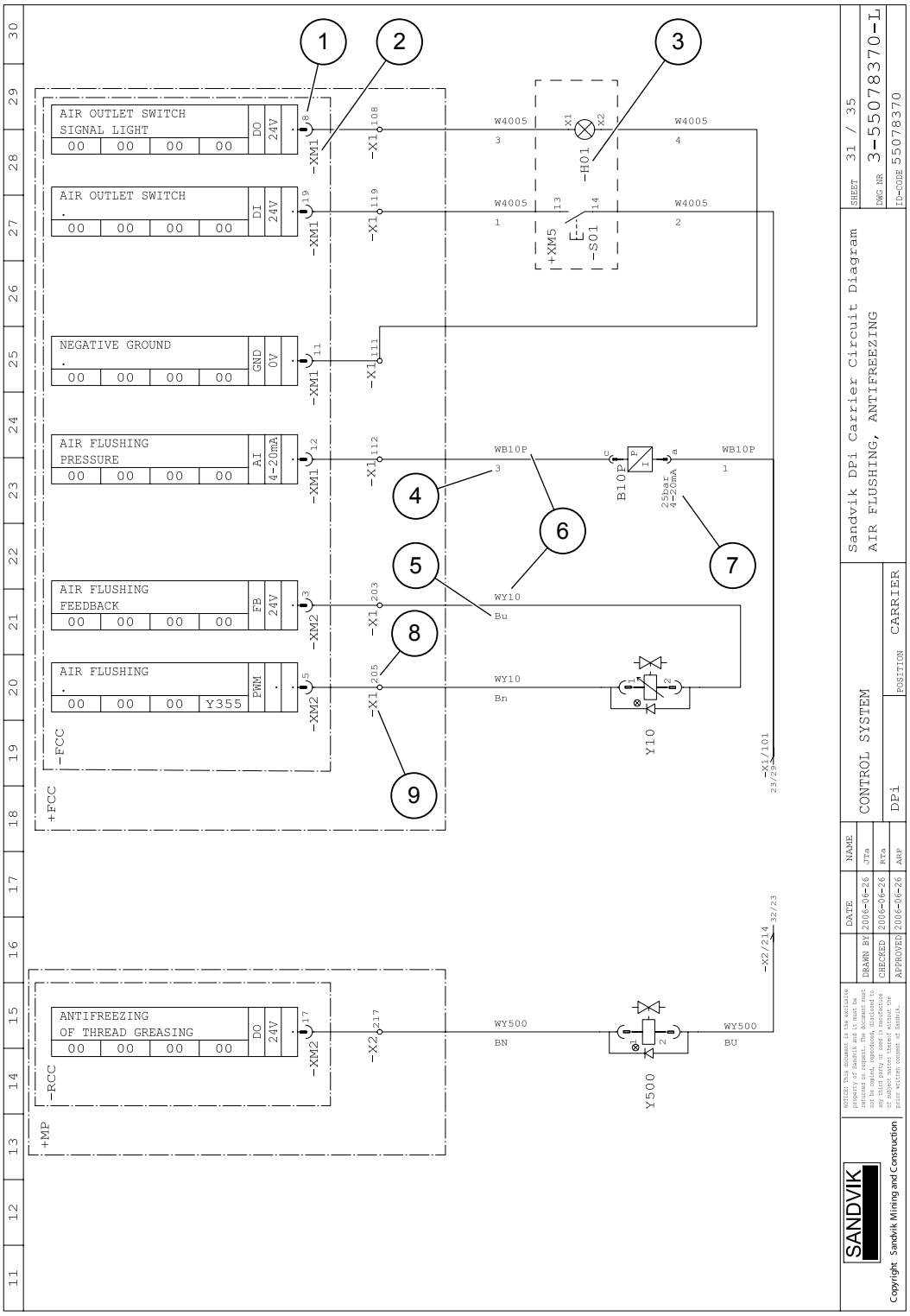
Cross-References of a component



1 Relay coil
2 Relay contacts

- Relay contacts are shown at the bottom of the sheet below the relay coil.
- The cross reference at the side of the relay contacts (below the coil) tells the location of the actual relay contacts.
- The cross reference at the side of the actual relay contacts tells the location of the relay coil.

2.5 Identification marking of components



1	*Connector pin number*	2	*Connector identification*
3	*Component identification*	4	*Wire number*
5	*Wire color*	6	*Cable identification*
7	*Component specifications*	8	*Terminal*
9	*Terminal block*		

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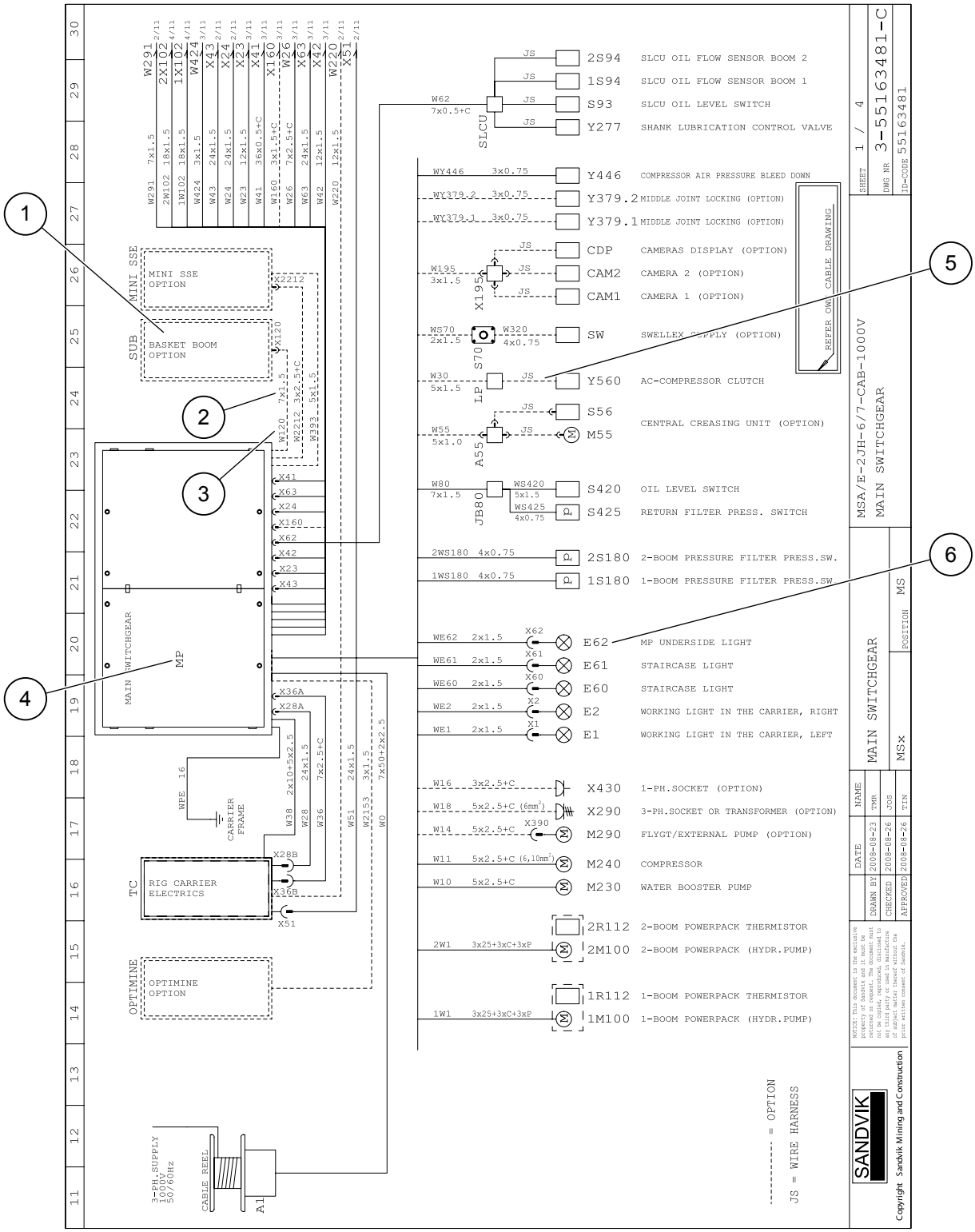
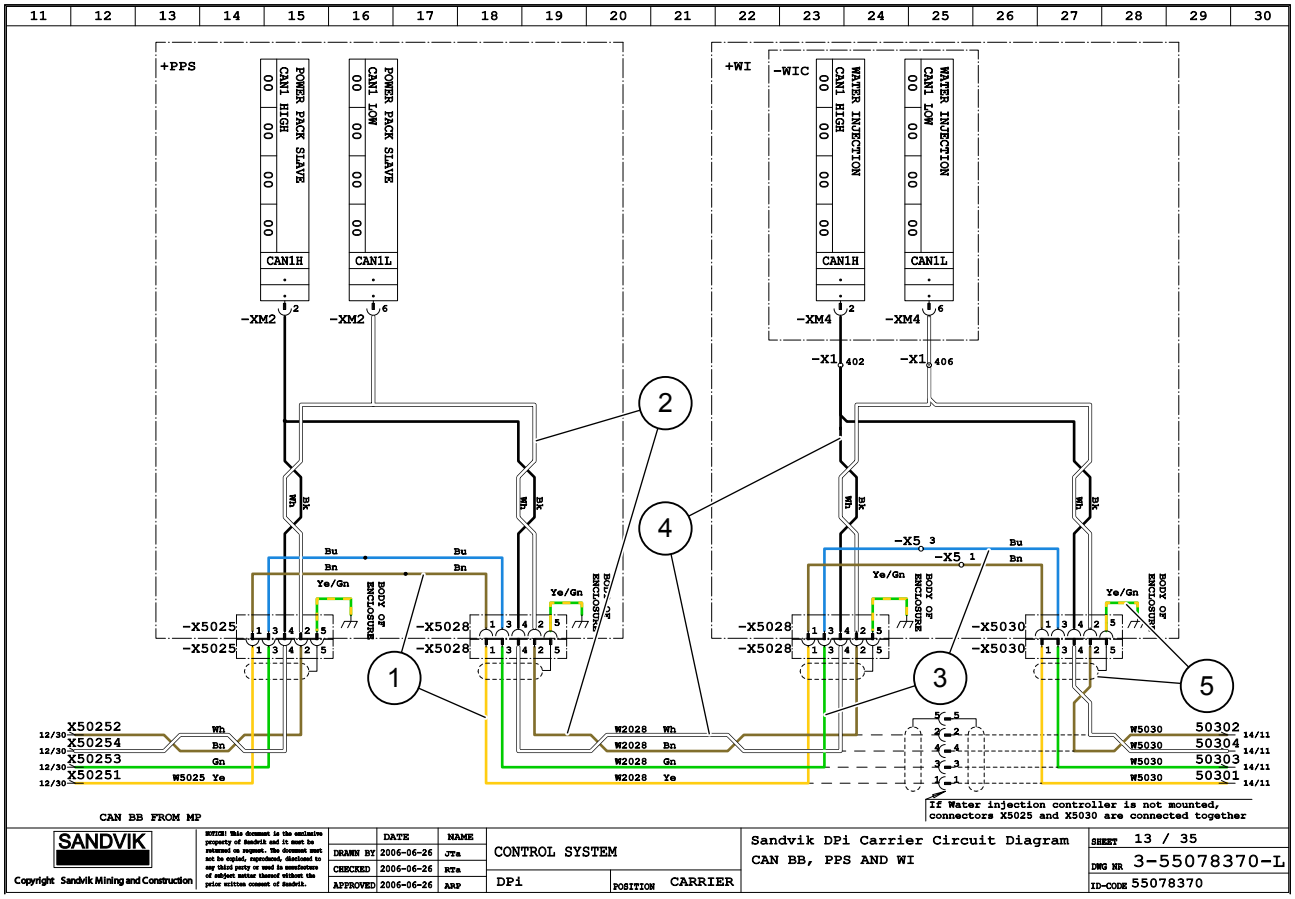
2.6 Cabling



1 Connection to subsystem
2 Cable type
3 Cable identification
4 Component identification
5 Dashed line = Option
6 Component identification

2.7 Can bus



An example of can bus wiring

1 *Vcc*
2 *Can low*
3 *Ground*
4 *Can high*
5 *Shield (ground)*

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