OPERATING AND MAINTENANCE INSTRUCTIONS FOR DUST AND FUME EXTRACTION SYSTEMS

CLIENT	:	TATA Steel UK Ltd Port Talbot Works Port Talbot Wales SA13 2NG
END USER		TATA Steel UK Ltd Port Talbot Concast Slab and Steel Workshop.
CONTRACT NO.	:	DE 3052

DUSCOVENT
Engineering Limited
86 Wellington Road North
Heaton Norris
STOCKPORT
Cheshire SK4 1HT

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web site : www.duscovent.co.uk

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   User instructions.

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3. Fan set.

4. Spark arrestor.

5. HEPA filter set.

6. Extract Arms.

7. Electrically actuated leg dampers.

8. Belimo actuated - Modular damper.

9. Electrical information.

9b. Differential pressure switch

10. Spares List

SECTION NO. 1

REFERENCE DRAWINGS LIST

DESIGN OVERVIEW

USER INSTRUCTIONS

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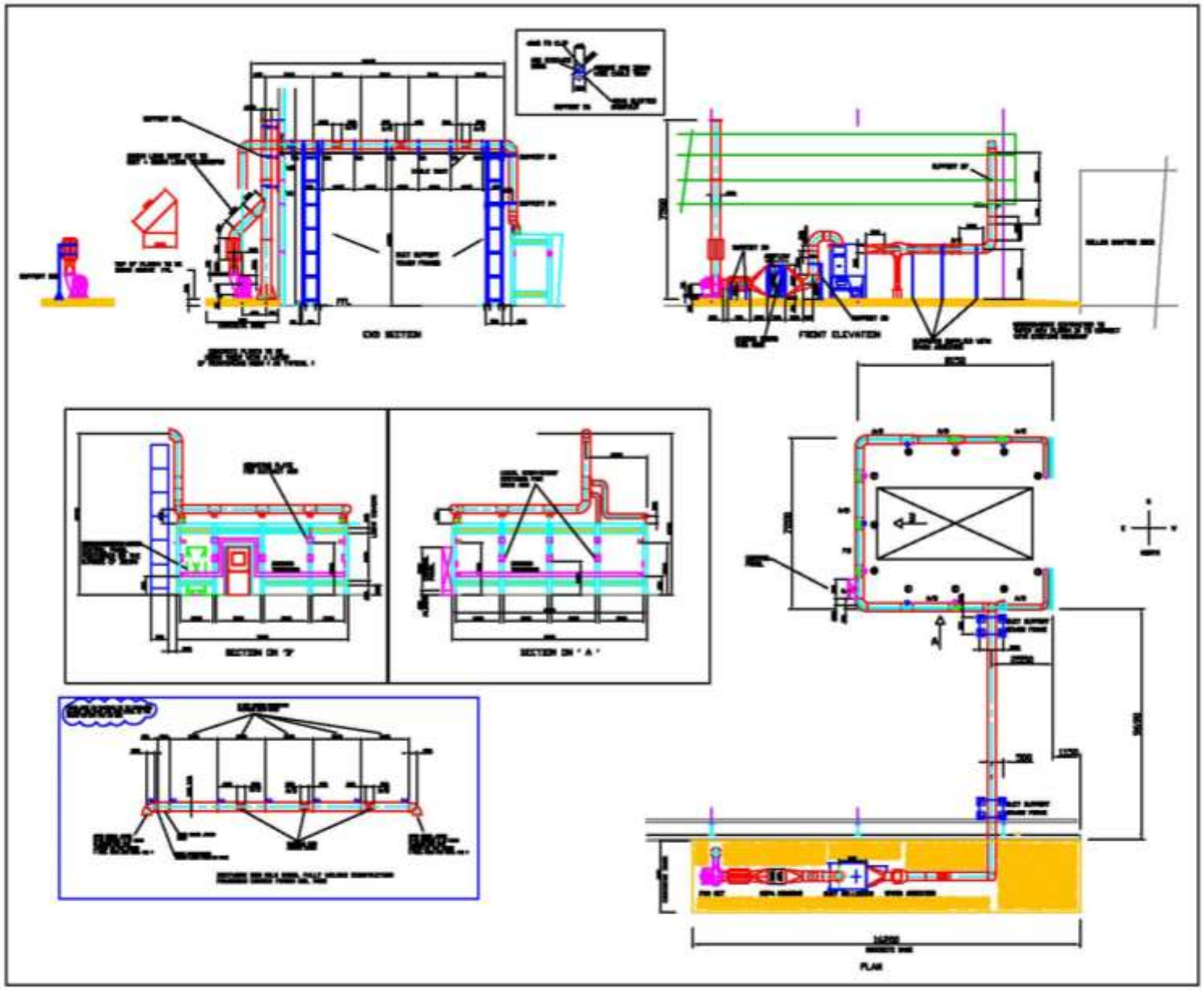
DRAWINGS LIST

DRAWING REF.	DESCRIPTION
DE3052.1	GA of dust extraction equipment
DE3052.2	Cartridge filter, GA and details
DE3052.3	Details of ductwork around the burning enclosure
DE3052.4	Schematic wiring diagram for extraction system.
DE3052.5	Details of electrical equipment and containment within the burning booth.
W6485.5	Wiring diagram and lighting circuits
W6485-017.3	Control station layout.



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ARRANGEMENT OF DUST EXTRACTION EQUIPMENT FOR BURNING BOOTH

DUTY 1.39 m3/s (5000 m3/h / 2943 cfm)

UNIT TO BE SUPPLIED WITH HEPA FILTER INSERT (MILD STEEL) [2 OFF]
PLEATED FILTER REFERENCE - E2013-20 Gr60 (031.2.603)
SIZE NOM. 609 x 609 x 292mm
FILTER TO BE BETTER THAN 99.95% EFFICIENT TO EN 14644 VOLUME METRIC

UNIT TO BE SUPPLIED WITH G4 DISPOSABLE WHITE CARD FRAME PLEATED PREFILTER [2 OFF]
PLEATED FILTER REFERENCE - EP4P625620047A01
SIZE NOM. 625 x 620 x 47mm

UNIT TO BE SUPPLIED WITH 30mm INTERNAL FLANGES ON INLET AND OUTLET
INTERNAL FLANGES TO BE FITTED WITH M8 HANK BUSHED ON CENTRE AS SHOWN.

UNIT TO BE MANUFACTURED FROM MILD STEEL (14 SWG)
UNIT TO BE EPOXY PAINTED PEBBLE GREY - RAL 7032
UNIT TO BE SUPPLIED WEATHER PROOFED TO CURRENT EMCEL SPECIFICATION
UNIT TO BE SUPPLIED WITH MAGNEHELIC GAUGES ON EACH SECTION

ALL WELDS TO BE AS LAID

GENERAL TOLERANCE
LINEAR = ±2
ANGULAR = ±1°

WEIGHT:N/A

C/W PART No. - 103.3.787
PART No. - 031.3.591

K:\drawings\2-metric\HEPA Units\E2203-30 Gr100\E2203-30 G100 - PRE & HEPA FILTER UNIT.iam

ISSUE		
	DESCRIPTION	DATE
A	FOR CUSTOMER APPROVAL	17/06/2020
B	FOR CUSTOMER APPROVAL	17/06/2020

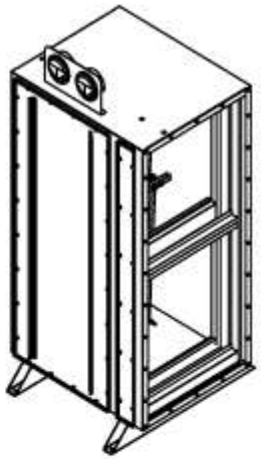
Designed by	Checked by			Date
Adrian Woods				04/06/2020

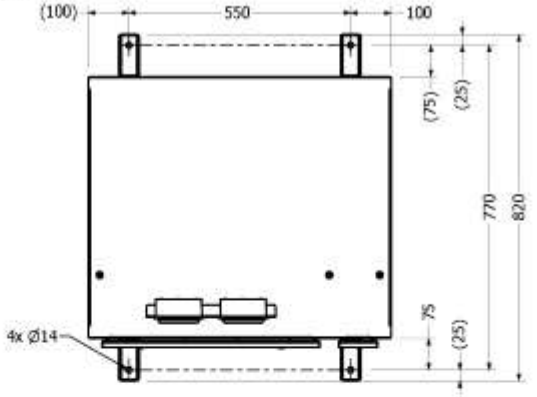
Emcel Filters Limited, Horsham, West Sussex
01403 253215

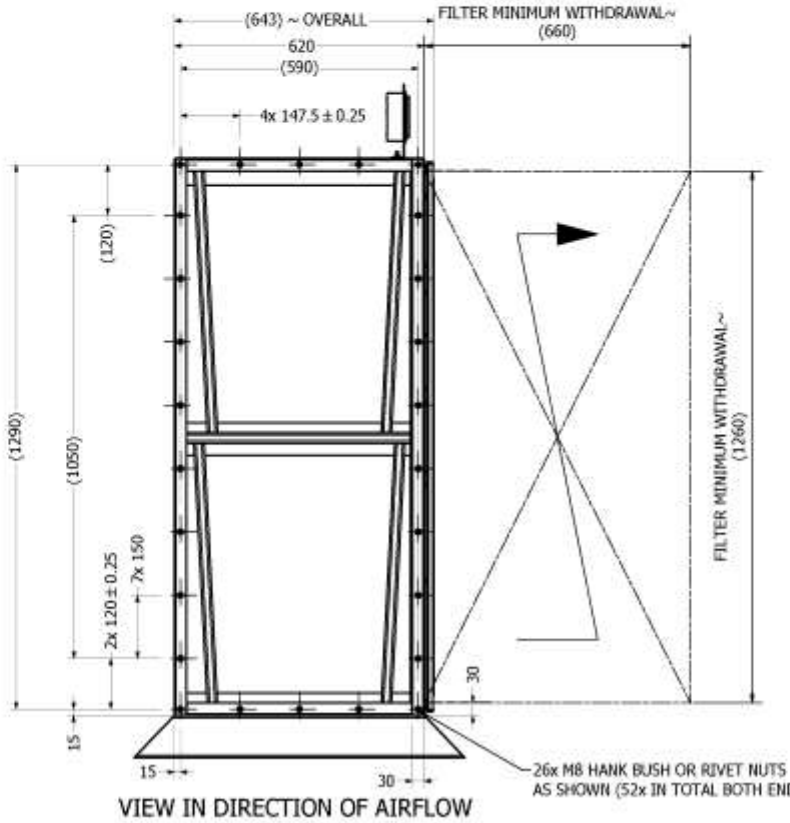
PRE & HEPA FILTER UNIT

DRG No. E2203-30 Gr100

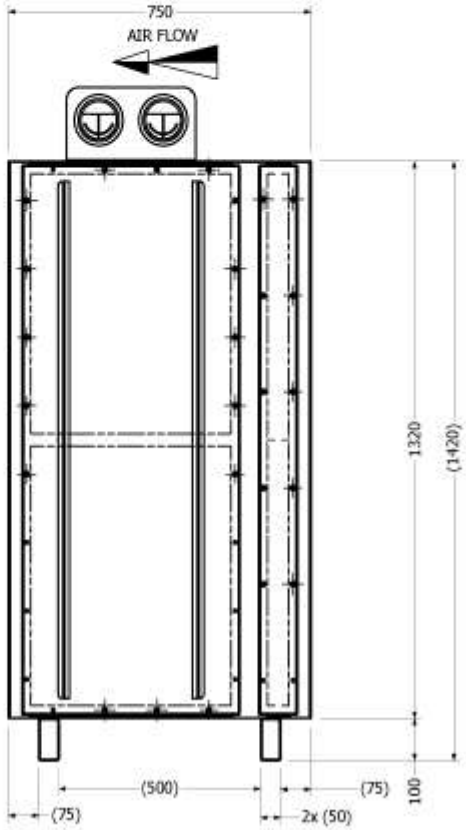
Sheet 1 / 1







VIEW IN DIRECTION OF AIRFLOW



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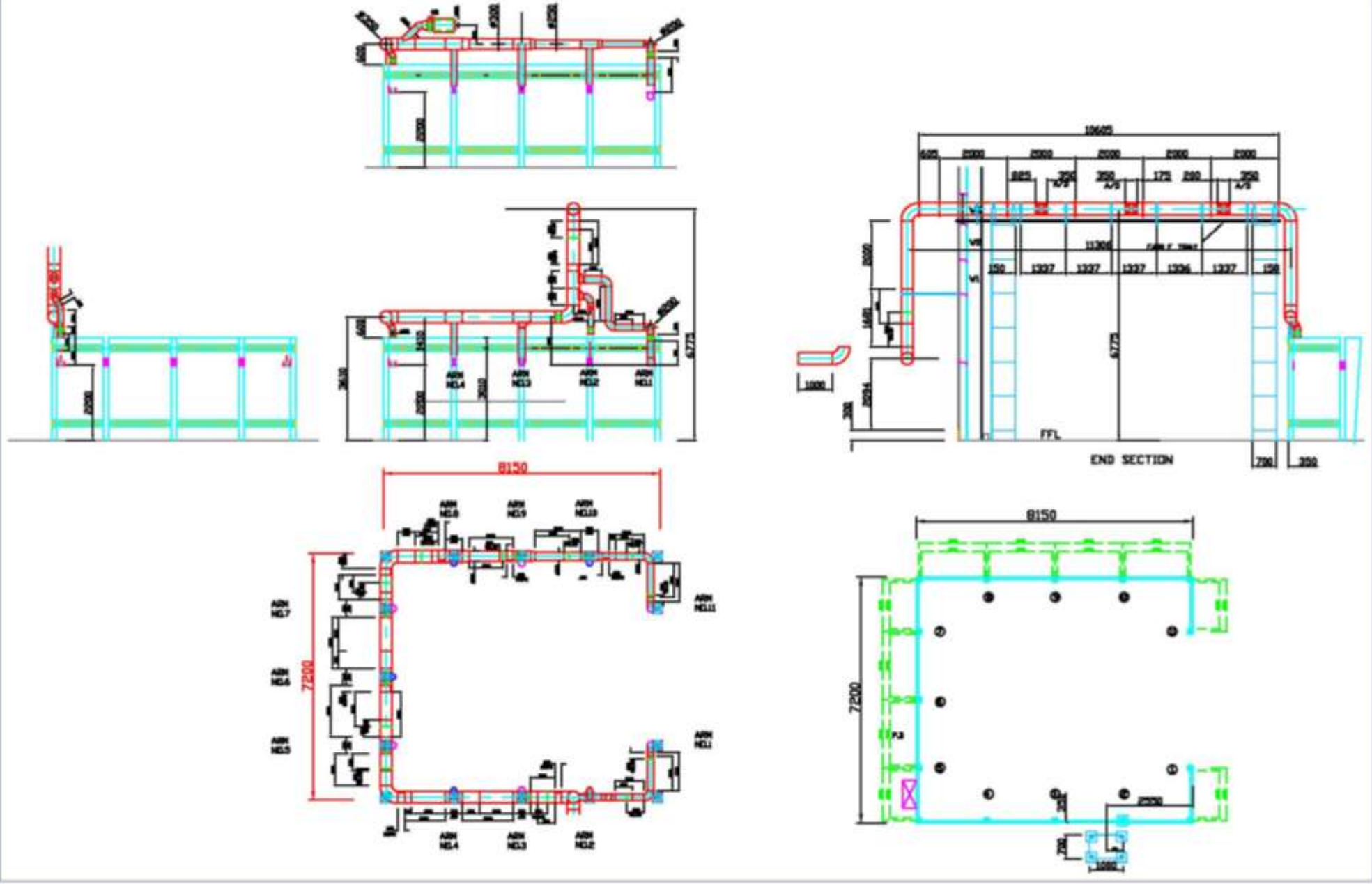

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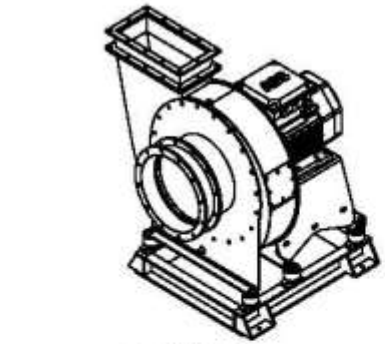
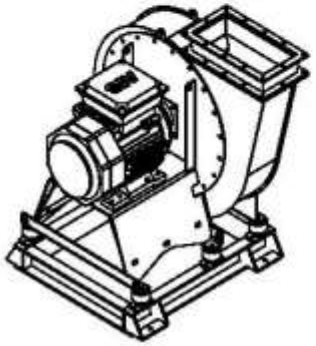
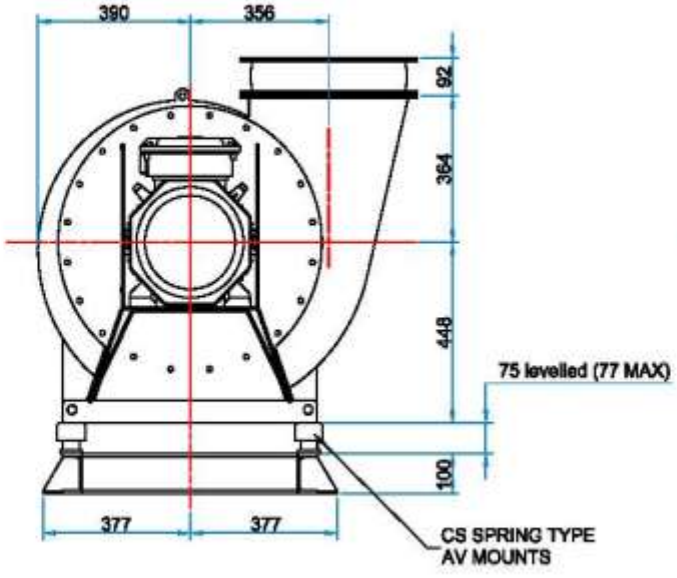
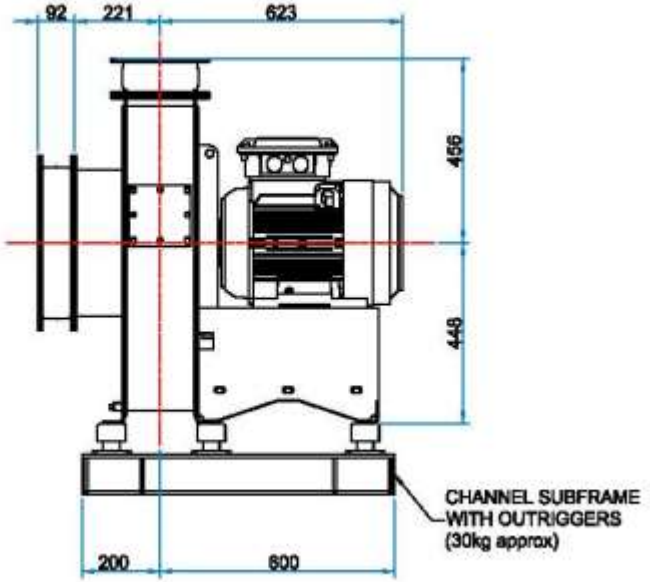
DETAILS OF DUCTWORK AROUND BURNING ENCLOSURE

LUGS INTEGRAL TO CASE SIDE PLATES ARE FOR MANUFACTURER USE ONLY - NOT FOR ASSEMBLY LIFTING





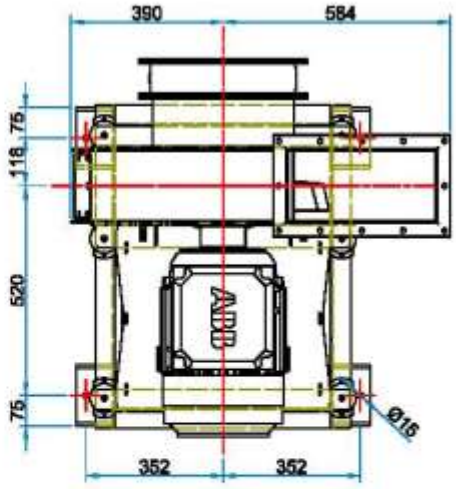




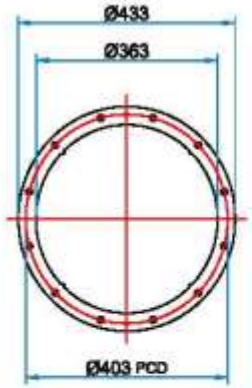
FAN MANUFACTURING DETAILS	
Approximate Fan Weight	289 kg
Maximum Design Temperature	80 °C
Fan Casing Material	S275
Pedestal Material	S275
Impeller Material	Mild Steel

FAN ANCILLARIES			
ATEX Certified Int.	No	Drain Socket	1/4" BSP
ATEX Certified Ext.	No	Inlet Flexible	Yes
Anti-Spark Features	No	Outlet Flexible	Yes
Cooling Disc & Guard	No	Inlet Guard	No
M10 Earthing Boss	No	Outlet Guard	No
Vibration Monitor	No	Access/Release Hatch	Yes

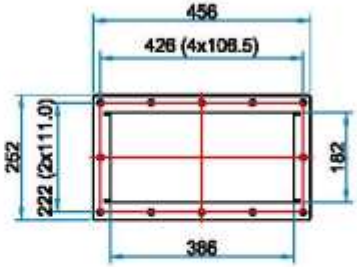
MOTOR DETAILS	
Manufacturer	ABB
Frame Size	160ML
Rated Power Output	11kW
Pole Qty	2
Power Supply	400V / 3ph / 50Hz
Enclosure / IP Rating	TEFC / IP55
Efficiency Class	IE3
Ares Classification	Safe Area



INLET & OUTLET FLEXIBLE CONNECTIONS
WITH BACKING FLANGES & LINER SLEEVES



INLET FLANGE DETAIL
(12x Ø12 OFF CTRS)



OUTLET FLANGE DETAIL
(12x Ø12)

Rev "A" AV Mount position changed

halifax fan
England's leading fan manufacturer

Halifax Fan Ltd., Brooldoot Business Park, Eland Road, Brighouse HD6 2SD
Telephone : (01484) 475123 Fax : (01484) 475122 Email: sales@halifax-fan.co.uk

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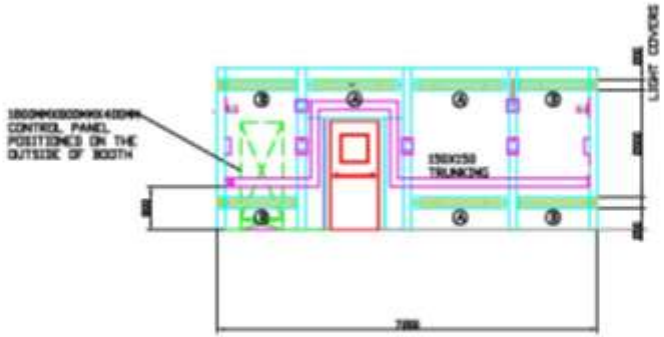
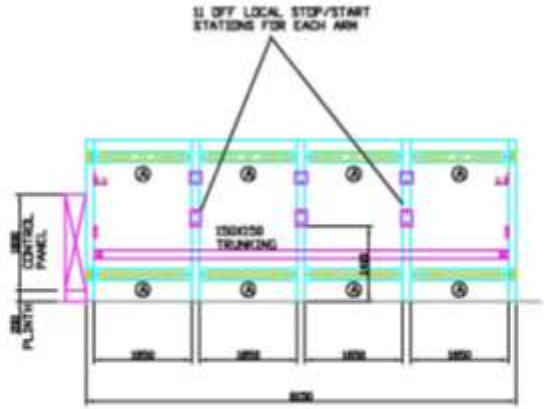
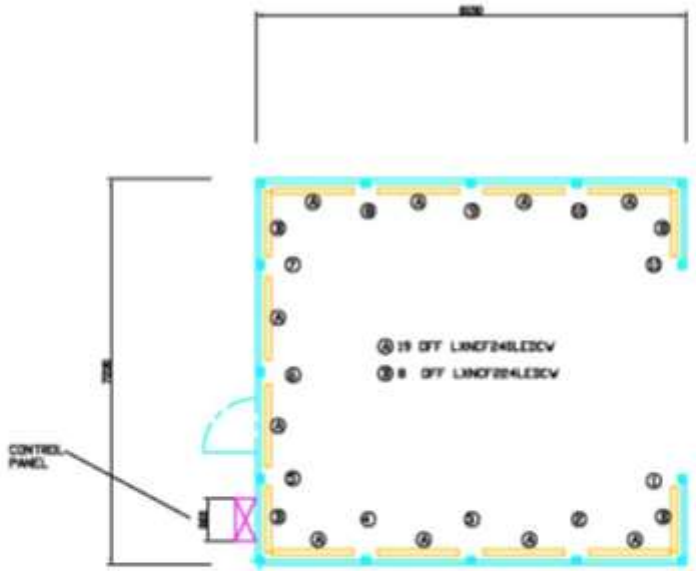
Drawing Type: General Arrangement
Item Type: Fan
Product Type: Chinook "S" BI
Fan Size: 21.5
Driving Arrangement: SP
Handing: L90
All Dimensions Are in mm Unless Otherwise Stated. Do NOT Scale. If In Doubt, Ask

Drawn	AW	Drawing Number	Rev
Date	11/09/2020	CB21.5_72423	A
Checked			
Customer		Duocovent Engineering Ltd	
Customer PO No.		DE 30870 / 3052 / BT	
Job No.		72423	Quantity 1







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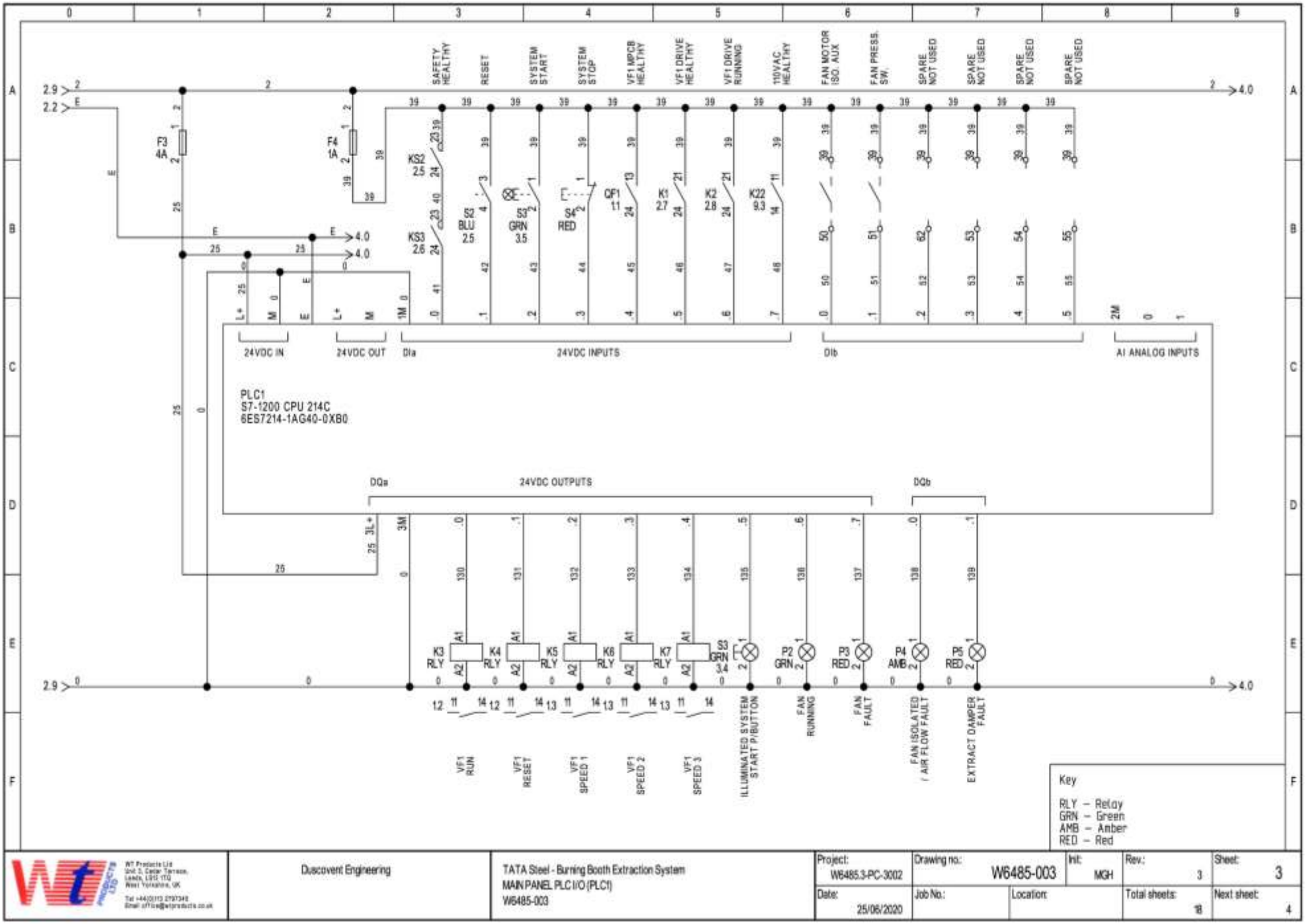
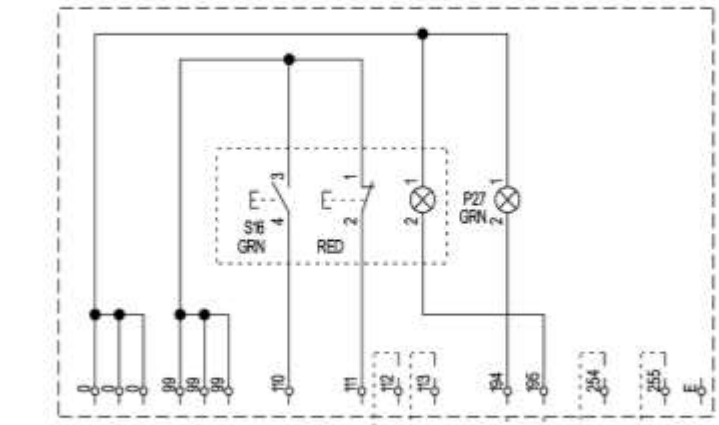
ARRANGEMENT OF LIGHTING FOR BURNING BOOTH



WT Products Ltd, Unit 3, Cedar Terrace, Leeds, LS12 1TQ, West Yorkshire, UK. Tel +44(0)113 2797349 Email: office@wtproducts.co.uk	Duscovent Engineering	TATA Steel - Burning Booth Extraction System MAIN PANEL PLC I/O (PLC1) W6485-003	Project: W6485.3-PC-3002	Drawing no.: W6485-003	Init: MGH	Rev.: 3
			Date: 25/06/2020	Job No.:	Location:	Total sheets: 18

Sheet: 3 | Next sheet: 4

ARM/POINT 11
CONTROL STATION / JB



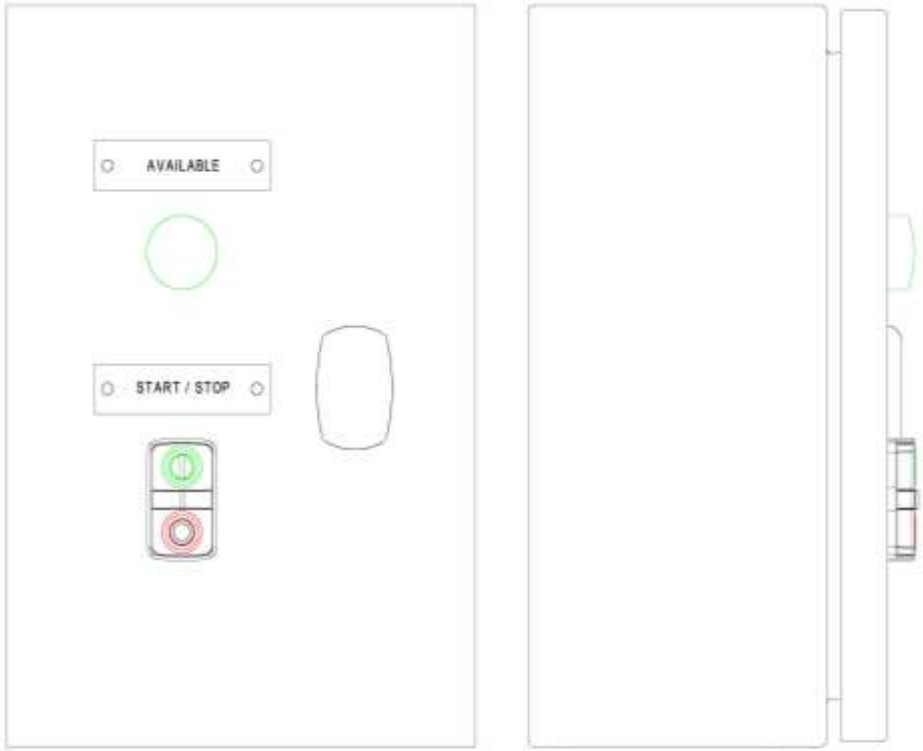
CONNECTIONS TO
MAIN PANEL

POINT 11 DAMPER
OPEN LIMIT SWITCH

POINT 11 DAMPER
CLOSED LIMIT SWITCH

POINT 11 DAMPER
CLOSE SOLENOID
(IF REQUIRED)

POINT 11 DAMPER
OPEN SOLENOID



CONTROL STATION LAYOUT
DIMENSIONS 200 x 300 x 150mm (WxHxD)

WT Products Ltd Unit 3, Cedar Terrace, Leeds, LS12 1TQ West Yorkshire, UK Tel: +44(0)113 2787340 Email: office@wtproducts.co.uk	Duscovent Engineering	TATA Steel - Burning Booth Extraction System POINT 11 CONTROL STATION / LAYOUT W6485-017	Project: W6485.3-PC-3002	Drawing no.: W6485-017	Init: MGH	Rev.: 3	Sheet: 17
			Date: 07/07/2020	Job No.:	Location:	Total sheets: 18	Next sheet: 18

DESIGN OVERVIEW

In the early part of 2020 Duscovent were asked to provide a quotation for a Burning Booth and the Dust and Fume Extraction LEV System for the Concast Slab and Steel Workshop.
Previously casting equipment with solidified split molten steel was transferred to the British Steel plant at Workington for the removal, by burning of the carbon steel spillage within purpose built booths which incorporate fume extraction. Due to current market conditions it was considered preferable to complete this work in-house at the Port Talbot site.

From our meetings with John Crofts, Stewart Reid and Marc Coram we were told that the mould heads can be up to 6.5m long x 3m high and there may be a maximum of 2 operators at any one time working to remove the split carbon steel. Each operator using a flame torch to cut away the spillage and it was expressed that occasionally hand held grinders may also be used.

We had previously looked at replicating the booths currently in use at Workington and the hinged canopy type fume extraction system currently in use within the building. However, our on-site discussions turned to the recent notification from the HSE regarding the re-classification of metal fumes as carcinogenic and the disadvantages of such booths which manoeuvre the fumes past the breathing zone of the operators and require large air volumes to be moved to meet minimum face capture velocity regulations.

We therefore suggested the use of articulated fume extract arms with flared capture hoods that could be brought into close position around the casting head to enable the fumes to be captured at source without passing through the operators breathing zone or being able to escape into the wider workshop environment. Each arm installed with its own control station local to the operation of the fume extraction system and on-task lighting - which is integral to the capture hood.

We supplied and installed a dedicated burning booth nominally 8.15m x 7.2m x 3m high to contain and prevent the drift of grinding dust within the workshop and to de-liniate a specific work area for the burning operations. The booth incorporates peripheral booth area lighting comprising 27-off twin tube LED strip lights mounted on each booth wall panel and a total of 11-off articulated extract arms each mounted on the booth support posts. The articulated extract arms connect to a single suction ductwork system, sized to allow up to a maximum of 4 arms in use at any one time, which connects to an externally located pulse jet filter unit and fan set discharging the filtered air via a discharge stack to atmosphere.
The general arrangement is shown on our attached drawing DE 3052.1.

The burning booth is constructed using heavy duty 150 x 150 mm rolled hollow suction posts, generally set at 2 m centres, with side wall panels constructed from 5 mm thick mild steel plate with folded edges to form panels nominally 1850mm wide x 3000mm high x 75mm deep. Booth components are secured to the concrete floor using through bolts.

Each light includes a heavy duty mesh safety cover. The 27 lights are linked together and controlled by a single switch located on the front of the main control panel adjacent to the entry point of the booth.

Each of the 11 booth support posts incorporates a fixing plate approximately 2.1 m above floor level to support the articulated arms. Each 4 m long arm consists of an anodised aluminium carrier arm complete with friction joints and pneumatic support cylinders with a powder coated mounting bracket at one end and a flared capture hood at the other. The flared capture hood is connected to the suction ductwork system using a high temperature, heavy duty silicone flex capable of handling temperatures up to 400^{o}C, which is then supported along the length of the

carrier arm. Each extract arm has a dedicated local remote electrical control station by pressing the green start button the extraction will be initialised and also the integral LED task light that is built into the capture hood (control wires are enclosed within the aluminium section of the carrier arm for their protection) is brought on and off with the arm selected.

The 4 m long arms are installed with alternating diameters. Across the main opening are Ø 200mm arms followed by Ø 160 mm arms alternating back to Ø 200 mm and so on, as requested.

Once operated, the control station start button will both energise the L.E.V. system and open the individual isolation valve associated with the arm. Via the control panel, the system will be restricted to allow a maximum of 4 arms to be in use at any one time and the extended reach of the arms allows a single operator to utilise multiple arms at the cutting point if required. LED Indicator lights are included on the control panel mimic and each remote station panel to allow operators inside the booth to recognise which arms are in use.

The ductwork is installed with a peripheral ring main supported from the booth panels with individual droppers to each arm which incorporate a quick acting electric isolation damper. The suction main is arranged to pass at high level at the end of the 2 storage racks. Duct support frames are installed to support the duct span between fully bolted flanges. The duct main is arranged to exit the building gable wall via the existing glazing panes, with 1 pane being removed and replaced by a galvanised steel weathering plate.

The suction main connects to the externally located filter plant. The initial filter stage is an in-line spark arrestor complete with centrifugal vanes, drop out chute and sealed dust container. The spark arrestor is fitted within the inlet duct to the main cartridge filter. The DFPR04 pulse clean cartridge filter unit (primary filter) incorporates 4-off pleated cartridge filters with a PTFE coating within a fabricated steel enclosure with a powder coated paint finish. The filter cartridges have a total filtration area of 70 m^2 and are located above a sealed collection bin. The filter unit includes an automatic compressed air pulse cleaning system with over-run timer for off-line cleaning, and this system will allow for 24 hour / 7 day operation if required. A secondary filter with G4 pre-filters and H13 rated HEPA filters are selected to remove any microscopic particulate prior to discharge to atmosphere. Each filter stage will incorporate a filter condition gauge complete with green and red field markings to afford a quick visual indication of filter condition.

The filter unit is served by an independent, floor mounted, centrifugal extract fan, fabricated from heavy duty steel plate and finished with a powder coated paint finish. The fan set will be directly driven by an 11 kw, 2 pole TEFC motor ready for connection to a suitably rated 415V/3PH/50HZ electrical supply. The fan set is designed to handle a total air volume of 5000 m^3/hr at calculated system resistance which will allow up to 4 arms to be in use at any one time. The fan set is installed complete with anti-vibration mounts, flexible connections and attenuation for an anticipated operating noise level of 70 dBA at 1 m, ± 3 dBA. The fan set will be arranged to discharge vertically to atmosphere with a discharge stack and weather cowl terminating above the line of the existing building glazing. The fan set will be constructed with dedicated lifting lugs and a bolted inspection plate.

Items to be fixed to the external concrete base using through bolts.

The system is controlled by a floor mounted control panel located adjacent to the booth entry point. The control panel will feature a floor standing enclosure nominally 800mm wide x 1800 mm high x 400mm deep, complete with:-

- Mains isolator.
- Transformer.
- 24DC Power supply to pneumatic isolation dampers.
- 24DC Power supply to task lights on arm hoods.
- 110V Power supply to filter cleaning panel.
- 11 kw invertor fan controller.
- Safety relay system.
- PLC to control remote damper operation.
- Contactor for booth lighting system.

The booth front features:-

- Manual start / stop button.
- Emergency stop button.
- Mains isolator.
- Re-set for safety circuit.
- Illuminated ‘power on’ indicator.
- Illuminated ‘control healthy’ indicator.
- Illuminated ‘fan run’ indicator.
- Illuminated ‘fan trip’ indicator.
- 11-off Illuminated indicators on an engraved mimic panel to show which arms are in use.
- Underside cable entry and plinth.

SECTION NO. 2

DUST COLLECTION UNIT.

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Engineering Limited
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Cheshire SK4 1HT

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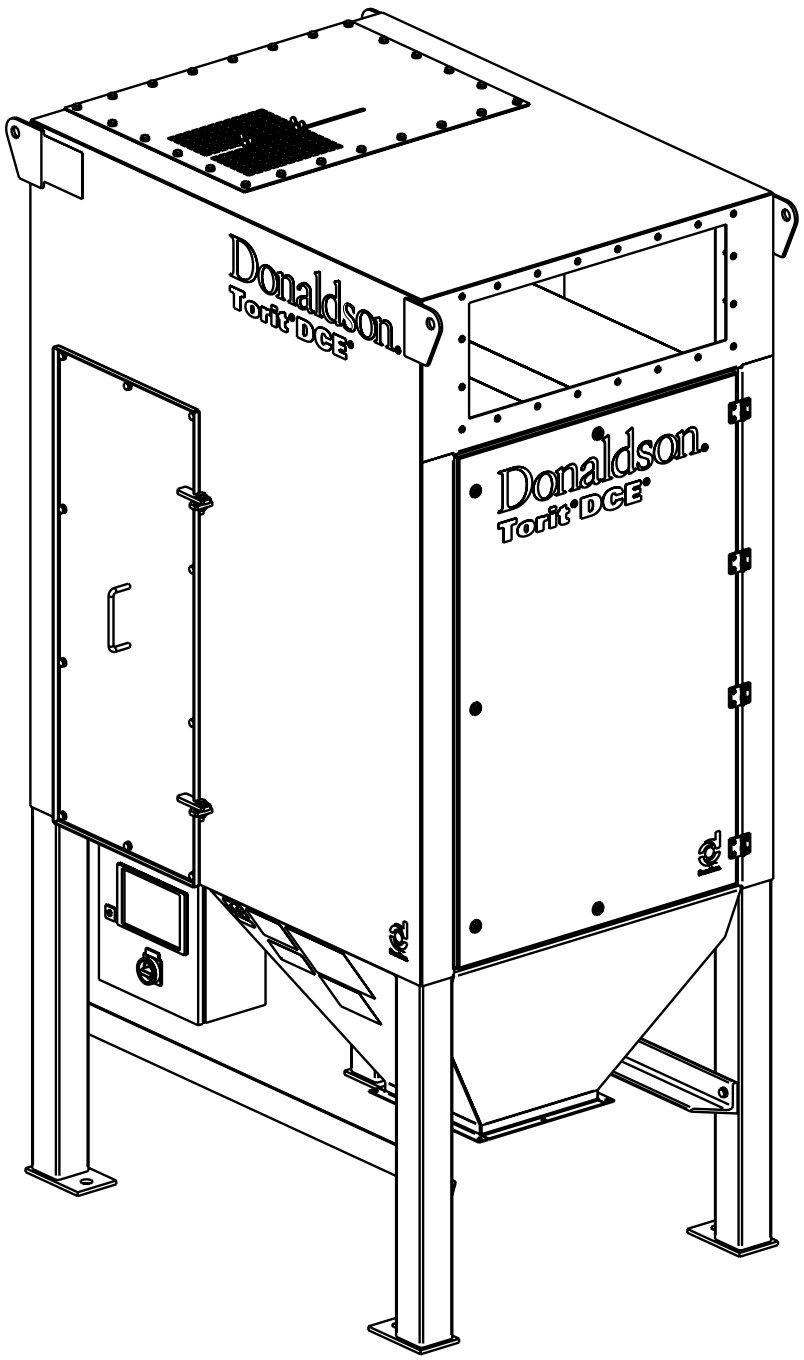
Fax No. : 0161 480 6503

email : sales@duscovent.co.uk
web site : www.duscovent.co.uk

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

DFPRO™ Dust Collectors

Series DFPRO 4-16 and DFPRO-R 4-16



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IMPORTANT

Please read this manual carefully before installation.

This manual should be read in conjunction with the respective controller manual supplied with the dust collector.

Product reliability, warranty and safe operation may be compromised by not following the guidance given in these documents.

Applications having a risk of sparks and fires

1. Good Housekeeping

Accumulation of potentially combustible dust, for example dust layers is considered a potential ignition source. Failure to keep the dust collector clean and empty the hopper / dust bins regularly will increase the risk of fires and/or explosions.

2. EU Directive 99/92/EC

A reinforced and/or vented dust collector must be used when handling dusts that have the potential to form an explosive atmosphere. If a non-reinforced and/or non vented dust collected is used on these applications then the end user must ensure an equivalent, secure, and fool proof basis of safety, which must be clearly documented in the end users Explosion Protection Document in line with Article 8 of EU Directive 99/92/EC.

3. Self Heating Materials

Please note that some materials have the potential to self generate heat and hence to become an ignition source, that could result in a fire and / or an explosion. For this reason ferrous and non-ferrous materials should not be extracted in to the same dust collector, as when combined they can create a violent thermite reaction that would ignite a fire and/or explosion.

4. Applications having a risk of sparks and fires

Where sparks are generated by the process, this must be considered as a potential ignition source which increases the risk of a fire or explosion. The filter can be supplied with an optional spark trap to help reduce the frequency of spark ignition and should be regarded as part of a risk reducing strategy.

The spark trap is not an extinguishment system and should never be relied upon to achieve spark eradication in processes where suppression requirements are absolute. The spark trap does not guarantee complete elimination of sparks and does not preclude the possibility of fire or explosion. Therefore, system redundancy and complementary measures should be taken in conjunction with the spark trap to further reduce the risk of fire and explosion from sparks in applications where there is potential for catastrophic combustion.

On these types of applications the enduser should carry out regular good housekeeping, such as:

- Periodically check for dust fall out in ducting and remove.
- Pulse down off line regularly to minimise retention of dust cake on filter cartridges.
- Empty dust bins frequently.

Other risk reducing strategies could include:

- Inject with an inert material.
- Consider additional spark detection and fire suppression equipment.

GENERAL SAFETY REQUIREMENTS

The collector should be stored as supplied. Only remove packaging to install. For the purposes of storage:

- *Collector with specification for inside use = IP50.*
- *Collector with specification for outside use = IP54.*

The dust collector should be used only when it is in a technically acceptable condition. Regular maintenance, as set out in this manual, is required to minimise technical failure. Third party supplied components (for example motors) should be maintained according to the manufacturer's instructions.

You should ensure any persons carrying out work on the supplied equipment follow any relevant recognised standards/codes, have received adequate training and are competent to do so. Areas requiring a competent person include:

- *Maintenance on any component identified as a potential ignition source.*
- *Lifting and erection.*
- *Electrical installation, inspection and maintenance work.*
- *Pneumatic installation, inspection and maintenance work.*
- *Any access to internal classified potentially explosive atmospheres where there may be a risk due to explosion.*

During assembly/installation or dismantling of equipment, potential ignition sources may occur that were not considered in the risk assessment of the unit in operation (for example, grinding, welding sparks, etc.)

You should use the dust collector in full accordance with the conditions set out in the Order Acknowledgment and relevant Scope of Delivery. Failure to do so may compromise product reliability, warranty and safety. The Scope of Delivery is an integral part of the manual.

Other items of equipment, not supplied under the Scope of Delivery from Donaldson, should be installed, operated and maintained according to the documentation supplied with the respective equipment.

Any modification carried out on the 'as supplied' equipment may reduce reliability and safety, and will nullify warranty; such actions fall outside the responsibility of the original supplier.

The hopper should not be used as a storage vessel. To prevent damage to the collector, care should be taken to avoid an excessive build up of heavy materials.

Where necessary for safety, the dust collector is fitted with fixed guards. Removal of these guards and any subsequent work should only be carried out after adequate precaution is taken to ensure it is safe to do so. All guards should be refitted before re-energising.

The access door requires tools to open. To avoid danger from rotating fan impellor, ensure fan is isolated and allow sufficient time for fan to become stationary.

Compressed air is recommended for collectors that operate using reverse jet cleaning. Alternative gases should be assessed before use to ensure that explosive atmospheres are not introduced during media cleaning.

Where the equipment supplied is suitable for working within a potentially explosive atmosphere (as defined by Directive 2014/34/EU) it will be according to the categories and conditions marked on the collector serial nameplate. You should ensure the equipment supplied by others is also suitable. If no marking is given on the serial nameplate then the supplied equipment is not suitable for use in potentially explosive atmospheres.

Care should be taken to ensure that any potentially explosive atmosphere is not present when performing operations that increase the risk of ignition (opening of controller for adjustment or electrical repair for example). Ensure the installation is always returned to its original state.

To reduce the risk of ignition when handling explosive or flammable materials, it is important that the accumulation of flammable deposits are prevented/ removed, e.g. from within ducting etc.

If the collector is handling a potentially explosive dust or is placed in a potentially explosive atmosphere, then all motors should be connected to thermal protection devices to prevent them exceeding their maximum surface temperature. All electrical equipment should comply with a category according to EN 60079-0.

Where the dust being processed can ignite due to exothermic reaction, including self ignition, the collector MUST be fitted with a suitable explosion protection method (venting for example). The risk of ignition can be minimised by avoiding the accumulation of dust layers with regular cleaning.

The dust collector may be fitted with explosion protection in the form of a vent panel. Precautions, as set out in the Scope of Delivery, are used to minimise the risk of ignition of any dust clouds contained within the dust collector. The possibility of other ignition sources being introduced into the collector during periods where any dust cloud may be present should be minimised. Particular care should be taken to avoid introducing glowing particles via the collector inlet ducting.

The explosion relief assembly, where fitted, has been designed to provide adequate safety from an explosion initiated from within the collector, for the given dust explosion characteristics and collector arrangement as set out in the Scope of Delivery. You should ensure that explosions are not allowed to propagate into the dust collector (using suitable isolation devices) since pressures may be generated leading to unsafe equipment rupture.

Where applicable, equipment connected to the dust collector (for example, a cyclone) should be protected, using suitable isolation devices, against the transfer of flame and pressure if, in the event of an explosion initiating inside the dust collector, the connected equipment is not capable of safely withstanding these effects.

The explosion relief assembly, where fitted to the dust collector, is not suitable for use with dusts that are classified as poisonous, corrosive, irritant, carcinogenic, teratogenic or multigenic unless the dust released during the explosion venting process can be contained to a safe level.

In order to ensure the required venting efficiency is maintained, the explosion relief assembly, if fitted to the collector, should not be obstructed in any way.

It may be necessary to provide a facility to shut down the equipment in the event of an explosion (where collectors are fitted with explosion relief panels). The signal should be taken from the bursting panel detection device.

Part of the risk assessment on possible ignition sources for dust and gas mixtures with very low MIE, has considered the electrostatic risk from cone discharges. Here the basis of safety is based on using a conductive bin, dusts with a median particle size of less than 400µm and advising frequent emptying.

You may wish to consider the use of a sprinkler system when handling explosive or flammable materials.

None of the fan assemblies can be considered to be a fully sealed design, indeed most are arranged with either an open inlet or an open outlet. For this reason, the internal and external atmospheres can be considered the same in terms of any potentially hazardous classification.

Standard fan assemblies should not exceed 3000 rpm (50 Hz supply) on systems fitted with an inverter drive.

The filtration media is suitable for filtering particulate only (and not gas).

Some applications are prone to risk of fire. This risk can be reduced by pulse cleaning and emptying the dust container regularly.

- *Any extinguishing technique and material used must be suitable for the flammable nature of the dust.*
- *A water sprinkler system can be fitted as a special option.*

Materials handled by the dust collector may be hazardous (e.g. toxic). Conduct a Risk Assessment to ensure correct technique is employed.

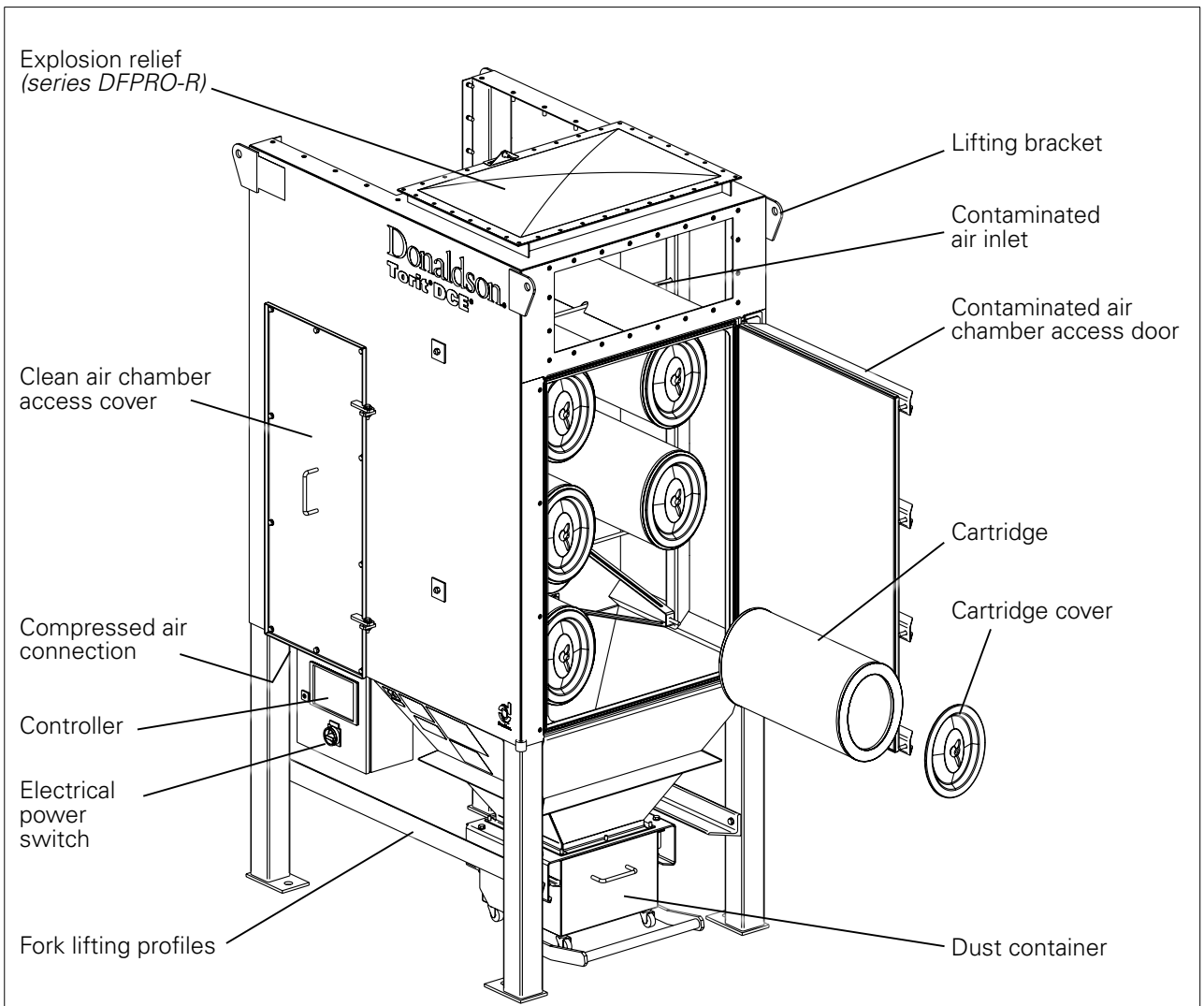


Figure 1: DFPRO dust collector. Model DFPRO-R 6 illustrated

INSTALLATION

The collector is not designed to support site-installed ducts, interconnecting piping or electrical services. All ducts, piping or electrical services must be adequately supported.

All external equipment connected to the dust collector (e.g. ducting) should be correctly sealed. This can be achieved by applying a continuous 5 mm bead of sealing compound to the mounting surface, along each side of the hole pattern. For non-Donaldson equipment please also check supplier's IOM manual for any specific requirements.

Required tools and equipment

- Crane/fork lift
- Slings/clevis pins and adequate lifting equipment
- Standard tools (e.g. screwdrivers, wrenches etc.)
- Drill
- Sealant

Delivery and inspection

The collector is normally supplied in one piece. Depending on your order, the following parts are shipped loose:

- Dust disposal system
- Transition pieces
- Fan set (if not pre-mounted)
- Silencer
- Platform
- Spare parts
- Anchor bolts
- Hardware and sealant
- Explosion detection device
- Paint can and brush

Compare the parts received against the packing list. If there is any damage or parts missing, notify the delivery company and your local Donaldson representative.

Series DFPRO-R collectors are supplied with the explosion panel mounted upside-down on the collector to prevent damage.

Location considerations

Where equipment is installed in a Potentially Explosive Atmosphere, care should be taken not to locate or use the collector where external ignition sources can be introduced, for example stray electric currents, lightening, electromagnetic waves, ionising radiation, ultrasonic waves.

When handling explosive or flammable materials and the risk of a fire is high, then precautions such as fitting a sprinkler system and not locating the collector in a zone 21/1 area should be considered.

When handling explosive or flammable materials the collector should be located so as to avoid external heat sources, e.g. from nearby processes or extreme direct sunlight.

Where applicable, care is required when siting the dust collector to ensure that the effects (flame, pressure, noise and fire) produced during and after the explosion venting process do not put at risk personnel and nearby plant.

The collector should be located with consideration for:

- Emptying the dust container.
- Shortest runs of inlet and outlet ductwork with radius bends on elbows as large as possible.
- Easy access to electrical and compressed air connections.
- Convenience of maintenance.

When calculating for foundations or support structure consider the following:

- The weight of the dust collector.
- The material being collected.
- All auxiliary equipment.
- Live loads.
- Snow and wind loads on outside installations.

For collector weights and dimensions refer to Publication 2707.

General guidance to lifting

The collector should be lifted using either the four-point lifting arrangement or the fork lifting arrangement (refer to figures 2 and 3).

During all lifting operations a crane or fork lift with an adequate SWL (safe working load) must be used. (Refer to lifting label located adjacent to lifting points for weight of equipment supplied by Donaldson).

When using the four-point lifting method, chains or slings with an adequate SWL (safe working load) must be used. (Refer to lifting label located adjacent to lifting points for weight of equipment supplied by Donaldson). Chains must be long enough to ensure that the included angle between diagonal chains is not greater than 90° (refer to figure 2).

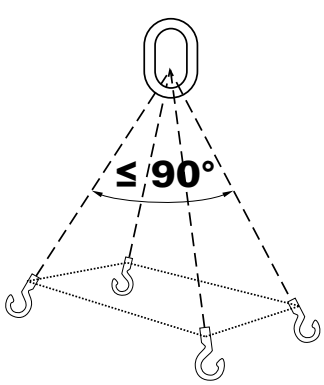


Figure 2: Four-point lifting arrangement

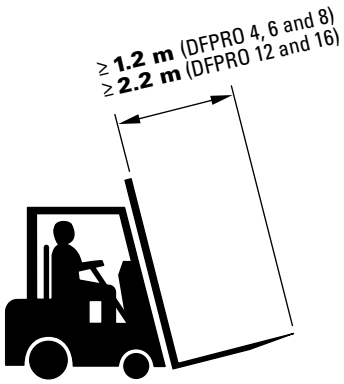


Figure 3: Fork lifting arrangement

Positioning the collector

1. Lift the collector into position following the general guidance to lifting.

   Take care not to damage dust container when using fork lifting method.

2. Using spirit levels, line up both horizontally and vertically, using shims where required.
3. Secure the collector to the foundation anchor bolts.

Explosion panel assembly (series DFPRO-R only)

1. Remove protective shipping cover from top of collector (underneath is the explosion panel positioned upside-down).
2. Inspect the panel and ensure it is clean.

   Handle the panel with extreme care.

   Check the location and system specifications correspond with the serial number and data on the panel serial plate.

Figure 4: Explosion panel serial plate and warning label

3. Apply sealant to top flange of collector, making a continuous 5 mm bead along each side of the holes.
4. Place panel on flange (bulged side facing upwards) and align bolt holes in flanges with drift pins.
5. Bolt panel and flange together using bolts, washers and nuts supplied.
6. Assemble the explosion detection device (bracket and signalling cable) and place into position.The signalling unit incl. cable loop must be integrated into the threaded cable connected in such way that the loop is matching the other side of the explosion panel. Pull the steel cable carefully through the cable loop and fix both mounting eyes with the mounting screw (min. M10) of the vent panel. Now pull the signalling unit carefully to a slight tension and tighten the threaded cable connection. The cable shall be at the crest to the dome of the panel or lead straight across in case of flat panels.

   It is mandatory that the cable connection is pulled tight otherwise the signalling unit does not break. No alarm signal is actuated. This means that no alarm contact or plant shut off is triggered. Heavy damages (e.g. due to further transport of burning material or uncontrolled product release) can be the consequence.

Inside location (series DFPRO-R only)

Refer also to figure 6.

Series DFPRO-R dust collectors located inside can be supplied with a special top flange, allowing an explosion duct (3m max. length) to be mounted around the explosion panel, directing the effects of an explosion to outside the premises.

1. Mount explosion duct onto top flange using hardware supplied.

The pre-drilled hole (on the side panel of the duct) should be on the same side as the detection switch (allowing the switch cable to pass through the duct).

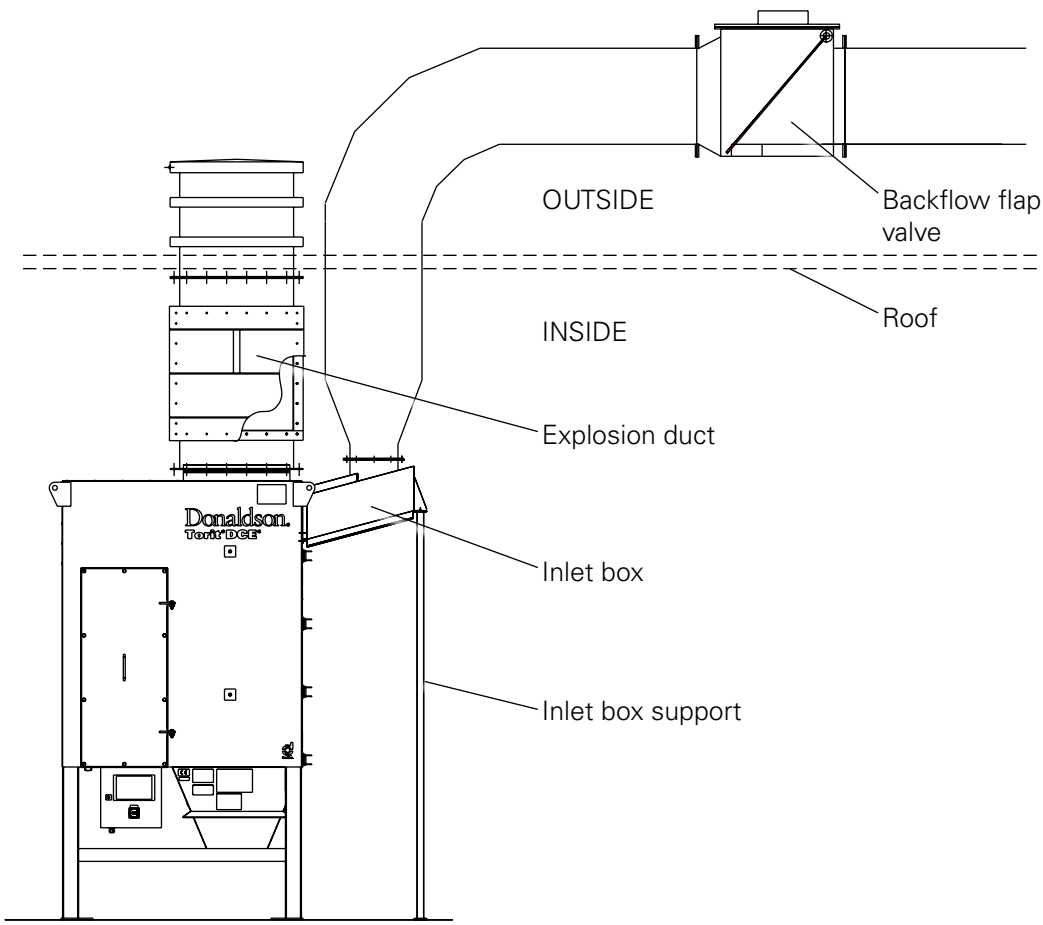


Figure 6: DFPRO-R typical inside installation

Cyclopeel / spark trap assembly

For collectors supplied with a cyclopeel pre-separator or a spark trap:

Refer also to figure 7.

1. Remove one column of filter cartridges from right-hand side of collector.
2. Using a two-point lifting arrangement lift cyclopeel / spark trap section.
3. Apply a continuous 5 mm bead of sealing compound to mounting surface of cyclopeel / spark trap section, along each side of hole pattern.
4. Lift cyclopeel / spark trap section into position and align bolt holes.
5. Bolt cyclopeel / spark trap section to side of collector.

The bolts in area 1 are fastened from inside the clean air chamber.

The bolts in area 2 are fastened from inside the contaminated air chamber.

The bolts in area 3 are fastened from inside the contaminated air chamber, through the contaminated air inlet.

6. Mount leg underneath cyclopeel / spark trap section.
7. Replace filter cartridges.

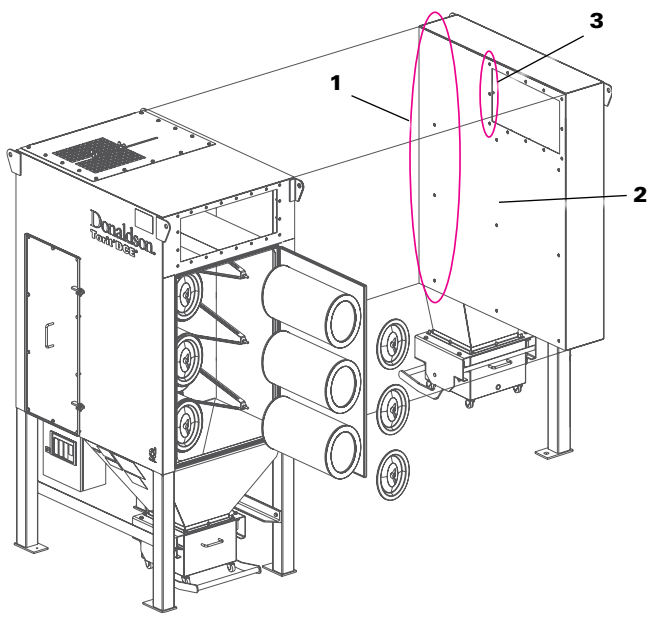


Figure 7: Cyclopeel / spark trap assembly

Optional fan box assembly

For collectors supplied with an optional fan box:

Refer also to figure 8.

The outlet position can be changed from the side to the rear by swapping the grill and cover before mounting the fan box.

1. Apply a continuous 5 mm bead of sealing compound to mounting surface of collector, along each side of hole pattern.
2. Using a four-point lifting arrangement lift fan box into position and align bolt holes.

3. Bolt fan box to collector.

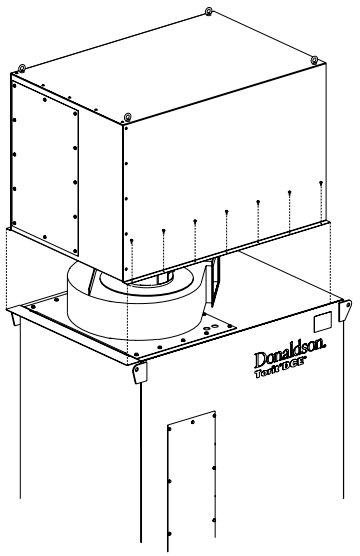


Figure 8: Fan box assembly

Optional platform assembly

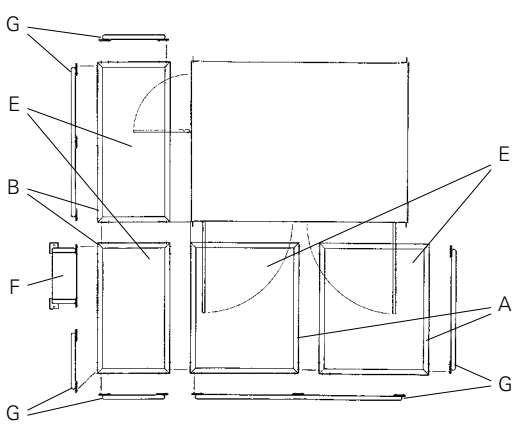
For collectors supplied with an optional platform:

Refer also to figure 9.

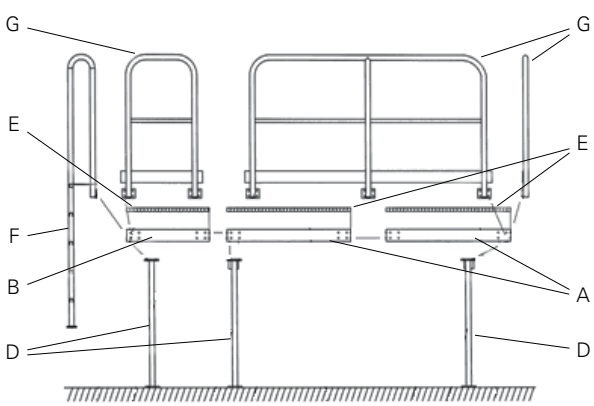
Maximum load: 200 kg/m²
Maximum point load (on surface 200 x 200 mm): 1500 N

1. Mount frames A and B (optional) on supports C and on legs D (M12 x 35 mm bolts).
2. (Optional) Connect frame A and B together (M10 x 35 mm bolts).
3. Mount walking grid E onto frames (1 fastener in each corner).
4. Mount ladder F onto frame (M10 x 30 mm bolts).

   The ladder can be mounted either end.
5. Mount guard rails G onto frame (M10 x 30 mm bolts).
6. Secure the platform and ladder to the foundation anchor bolts.



PLAN ELEVATION



FRONT ELEVATION

Figure 9: Platform assembly

Optional dust container assembly

For collectors supplied with an optional dust container:

Refer also to figure 10.

1. Apply a continuous 5 mm bead of sealing compound to mounting surface of dust container, along each side of bolt pattern.
2. Bolt dust container to hopper flange.

The dust container can be mounted to operate from the front, rear or either side.

3. If supplied, assemble the pressure balance pipe according to figure 11.

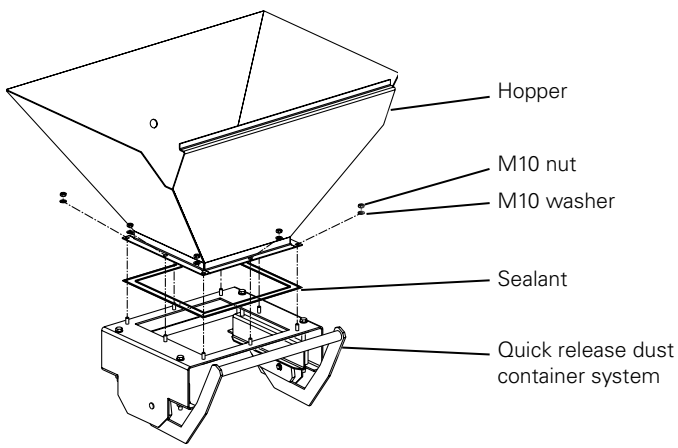


Figure 10: Dust container assembly

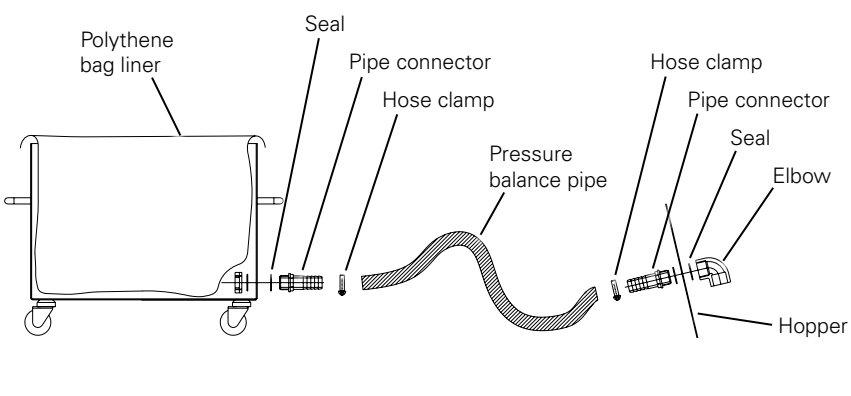


Figure 11: Pressure balance pipe assembly

Compressed air requirements

DFPRO dust collectors require an independent supply of clean, dry, oil-free compressed air. Details of pressure and quantity requirements are given in Table 3 (refer to 'Specification' section). A design label is also attached to each manifold. Where an existing factory mains system is to be used it may be necessary to install an additional moisture separator in the supply line to the collector. If a compressor is being installed to supply the collector, then the following conditions should be observed as far as possible:

Type of compressor

Use a compressor of ample capacity – an overloaded compressor may produce excessively contaminated, moisture-laden air.

Location of air intake

Avoid locating the air intake in an excessively polluted area and install an adequate air intake filter. The compressor air intake should be sited, if possible, on the north side of the building – fresh air drawn from the north side is usually cooler and denser, and therefore has a lower moisture content. (South of the equator the reverse will apply).

Layout and installation of air lines

The pipework between compressor and dust collector should be long enough to act as a cooling device for the compressed air. A typical requirement for the smaller installation would be 10 m (30ft) of 12 mm (½" NB) piping. For further details see Table 3. The piping should be installed to provide a fall in the direction of air flow to assist in the drainage of accumulated moisture. A moisture separator should be provided at the lowest point of the installation.

Pressure relief

The manifold has a maximum design pressure of 7 bar (see Table 2 in 'Specifications' section). It is a requirement that adequate protection is made not to exceed this pressure.

Controller

It is a requirement of the Supply of Machinery (Safety) Regulations 1992 to provide adequate isolation and emergency stop facilities. Due to the varied nature of site installations this cannot be provided by Donaldson but instead is the responsibility of the customer.

Always isolate power before opening the controller.

Each DFPRO dust collector is supplied with a factory fitted C-controller to operate the fan and the compressed air cleaning system.

For controller connections and set-up, refer to the controller manual.

Details of standard fan motor supply voltage are given in Table 4 (refer to 'Specification' section).

Overload protection

All feeder circuits should be adequately protected with suitably-rated fuses and contactors with integral overload protection.

Antistatic earthing

It is particularly important on collectors having antistatic features and/or explosion relief, that the earthing post, (located adjacent to the symbol shown) is properly connected to earth using the brass screw provided, to prevent any static build-up.

EEx controls

When the dust collector is to be installed in a hazardous area, where there is a risk of fire or explosion, the collector will be marked for the area(s) it can be safely used within (refer to collector serial nameplate). In some instances the collector may be fitted with the following control system:

EExd solenoids and remote controller

When this option is fitted, the dust collector has its solenoid valves in an EExd IIb T6 enclosure mounted inside the clean air chamber. A controller, housed in an IP66 box, is supplied loose. This must be installed in a safe area and connected to the solenoid valves on the dust collector using suitable cabling (not supplied).

It is recommended that cable with a core size of 1,5 mm² is used.

The maximum length of cabling that can be used is 30 m.

Instructions for setting up the controller are the same as those for the standard controller and can be found in the controller manual.

Explosion relief

Explosion panels, if fitted, must be relieved to a safe area in accordance with Factory Inspectorate recommendations. The explosion relief area is suitable for the collector volume only. Consult Donaldson for specific collector design pressures.

If providing a facility to shut down the equipment in the event of an explosion, the signal should be taken from the explosion relief panel detection device (refer to figure 12).

When connecting to the detection device, the following must be taken into account:

- *maximum supply voltage: 30V DC*
- *maximum current: 100mA / 3W*

When the detection device is located in a hazardous area, the electric circuit to the indicator must be intrinsically safe (e.g. by using an isolation amplifier).

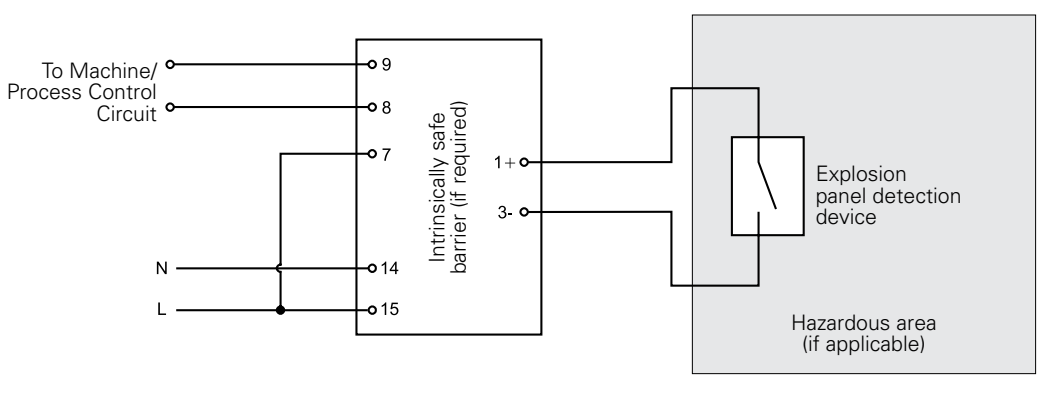


Figure 12: Explosion relief detection device circuit diagram

Installation check list

- ☐ Where applicable, ensure that the collector is securely bolted to the floor.
- ☐ Ensure compressed air supply is installed correctly and free from leaks.
- ☐ Ensure electrical supply is installed correctly and complies to local legislation.
- ☐ Ensure collectors fitted with antistatic features and/or explosion relief are suitably earthed.
- ☐ Where fitted, ensure explosion relief panels vent to a safe area.

COMMISSIONING

It is a requirement of the Supply of Machinery (Safety) Regulations 1992 to provide adequate isolation and emergency stop facilities. Due to the varied nature of site installations this cannot be provided by Donaldson but instead is the responsibility of the customer.

When making your preliminary checks, or during the start-up sequence, particularly note that on collectors fitted with an explosion panel the cleaning system should not be operated on its own for longer than necessary as the positive pressure produced could weaken the panel.

Before putting the dust collector into service the following items should be checked. Similar checks, as appropriate, should be made after any major overhaul.

Commissioning check list

- ☐ Where applicable, ensure that the collector is securely bolted to the floor.
- ☐ Ensure dust disposal system is correctly installed.
- ☐ Ensure all ducting is complete, all detachable panels are in position and fixed guards are secure.
- ☐ Check airflow damper is half-closed.

  The airflow damper is located on the top of collectors with fans up to 3 kW and located inside the clean air chamber on collectors with larger fans.
- ☐ Ensure collectors fitted with an earthing post are suitably earthed.
- ☐ Where fitted, ensure explosion relief panels are venting to a safe area.
- ☐ Ensure electrical power is available.
- ☐ Check fan motor for correct rotation and that the full load current is not exceeded. (Refer to the fan rotation label located on the fan mounting plate inside the clean air chamber).

  Keep clear of inlet opening/rotating impeller whilst performing rotation check.

  To reverse rotation (single phase power supply):
  Follow manufacturer's instructions on the motor nameplate.

  To reverse rotation (three phase power supply):
  Turn electrical power OFF at source and switch any two phase wires on either the motor junction box or the controller input terminals.
- ☐ Ensure access panel seals are intact, then close and secure the panels.
- ☐ Ensure the compressed air manifold has sufficient protection for overpressure.
- ☐ Start the compressor and check that the air supply is maintained at the recommended pressure.
- ☐ Switch on the controller.

  Cleaning system will not operate until the differential pressure rises above a set value of 80 daPa.

If any of the above check boxes are not ticked, then the reasons why should be investigated. (Refer to fault location table in 'Maintenance' section).

Start-up sequence

1. Turn on compressed air supply.
2. Check that the compressed air supply is maintained at the recommended pressure.
3. Switch on controller.
4. Adjust airflow using the damper.

Shut-down sequence

At the end of any period of operation it is most important that all residual deposits are cleared from the filter cartridges, casing, and discharge hopper. To achieve this, equipment should be shut down in the following order:

1. Stop fan only, leaving controller and compressed air supply switched on to allow filter to be cleaned 'off-line'.

To enable off-line cleaning, see controller manual.

This procedure is not recommended where explosion panels are fitted, as damage could result to the panel. In such cases consult with Donaldson.

2. After 10-15 minutes, switch off controller and compressor.

Where the dust being handled has self-heating properties, it is important to remove any deposits in the dust container to reduce the risk of an explosion.

Adherence to the above procedure will ensure that the dust collector installation is maintained at optimum efficiency.

OPERATION

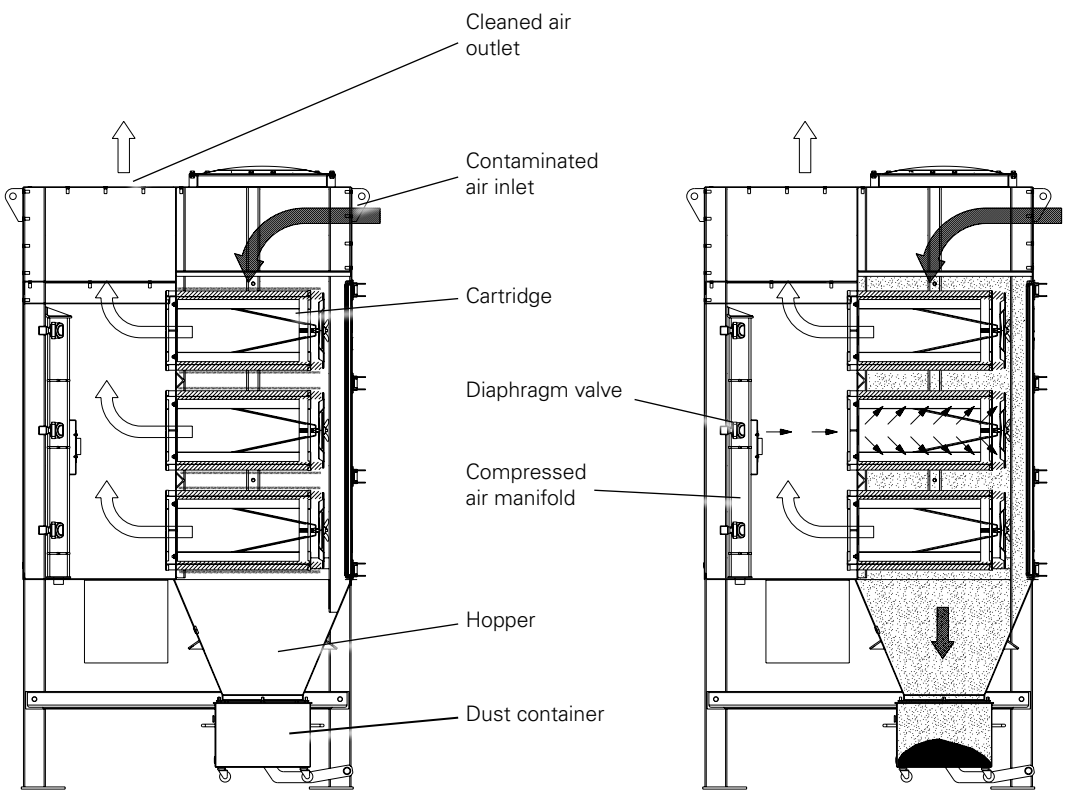
On installations where the inlet duct is relatively short, this procedure may result in a dust emission occurring at the inlet and therefore may not be an appropriate procedure if the dust being handled is dangerous. Therefore a Risk Assessment must be carried out to ensure the final procedure is safe.

Principle of operation

(Refer also to figure 13).

Contaminated air from the dust generation source is drawn through the inlet to the collector by the fan. Airflow is directed through the collector and heavier particulate falls directly into the hopper. The cartridges remove the fine particulate and clean, filtered air passes through the cartridge to the clean air chamber and discharges through the clean air outlet.

At regular intervals, governed by the controller, each cartridge in turn receives a short burst of compressed air from an adjacent air diaphragm valve. These valves are at an optimum distance from the cartridge, ensuring that a large volume of air is induced by each injection of compressed air, causing a brief, powerful reversal of airflow through the cartridge, effectively dislodging the dust layer which then falls into the discharge hopper.



a Filtering operation (continuous)

b Cleaning operation (intermittent)
(Each cartridge is cleaned separately, in turn)

Figure 13: Principle of operation

Dust disposal

For safe handling of the dust container an assessment must be made to satisfy the requirements of the European Directive 90/269/EEC on manual handling.

Dust containers may require regular emptying. If the dust being handled is explosive, then care should be taken to ensure that dust spillage is kept to a minimum to avoid the creation of potentially explosive atmospheres and secondary hazards.

Dust containers should securely replaced and resealed prior to collector restart. This is a good time to check the dust container for damage, which may lead to a dust leak or flame emission in the rare instance of an internal explosion.

Turn off the dust collector and empty the dust container on a regular basis using one of the following procedures:

Empty the dust container when ¾ full.

Standard dust container

1. Release the container by lowering the handle.
2. Remove and empty the container.
3. Replace container by sliding it back into position.
4. Reseal the container by raising the handle.

Dust container with pressure balance

1. Release the container by lowering the handle.
2. Slide the container out.
3. The polythene bag liner can be sealed in a manner to suit the toxicity of the dust and then removed.
4. Fit a new polythene bag into the dust container and slide the container back into position.
5. Reseal the container by raising the handle.

MAINTENANCE

A platform should be used when carrying out maintenance where the position of the technician's feet is greater or equal to 2 metres above ground level.

Before any work is carried out, ensure the equipment is adequately isolated and safe.

Ensure the pneumatic system is fully isolated and depressurised before any work is carried out.

For ancillary equipment not manufactured by Donaldson, refer to manufacturer's instructions.

If it is unavoidable to work on the equipment while a potentially explosive atmosphere is present, care should be taken to avoid introducing ignition sources not present during expected operation. Non-sparking tools should be used.

Access to the contaminated air chamber of the equipment may create risks and hazards that under normal circumstances are not present and as such this work must be carried out by competent personnel. These risks include inhalation of dust and potential explosion hazards. Appropriate personal protection equipment (PPE) should be used, e.g. dust mask, safety hat, gloves etc.

The explosion relief panel, if fitted, should be replaced immediately if deformed in any way.

In order to maintain the original collector specification and to ensure the same level of safety, only genuine spare parts should be fitted.

Every care has been taken to avoid the risk of ignition of a flammable atmosphere. The measures taken to avoid ignition should not be altered since this may result in unsafe operation. Particular care should be taken during maintenance and component replacement to ensure the same level of safety is maintained. When replacing fan impellers, avoid any rubbing of components (to prevent mechanical sparks).

Care should be taken during cleaning and maintenance to avoid creating static discharges that have the potential to ignite a flammable atmosphere.

When carrying out maintenance always follow typical best practice to local regulations (e.g. TRGS 560).

Routine inspection

To maintain the optimum performance of the dust collector, a routine inspection should be made to minimise down-time in the event of equipment malfunction, particularly on continuous performance applications and to ensure the equipment is maintained to its original supply condition.

Any abnormal change in pressure differential across the filter cartridges indicates a change in operating conditions and a fault to be rectified. For example, a prolonged stoppage of compressed air will cause an excessive build-up of dust on the cartridges, resulting in a greatly increased pressure drop.

After the fault has been rectified, resumption of compressed air cleaning will usually return the filter to normal efficiency. However, it is advisable to operate the in still-air conditions for a short period to dislodge any accumulated dust before putting the collector into operation.

Filter resistance can be checked by viewing the display on the front panel of the controller. This will give a continuous indication of the state of the filter. Once running, the operating resistance will be relatively stable, the actual value depending on the air volume and the characteristics of the dust being handled.

If the pressure differential exceeds 120 mm WG, check the following:

- *The compressed air supply is installed correctly, is free of water or oil and is maintained at the recommended pressure (refer to Table 3).*
- *The differential pressure connections are not blocked.*
- *The solenoid and diaphragm valves are functioning correctly.*
- *The controller is operational.*
- *The dust container is properly sealed.*

If the pressure differential still exceeds 120 mm WG after checking the above, then reduce the pulse cleaning interval time to see if this will improve the cleaning of the filter cartridges and, in turn, lower the pressure differential (details of pulse interval settings are provided in the controller manual).

If the pressure differential exceeds 150 mm WG, then the cartridges have reached the end of their lifetime and need replacing.

Ignition minimising fans are fitted with a lining inside the casing. As this may only offer protection for a limited period, if there is any upset condition leading to rubbing, then the fan must be switched off immediately and the condition corrected.

It is recommended to periodically inspect the general casing integrity.

Do not operate above recommended compressed air pressure. Excessive pressure will reduce the working life of components.

Collectors fitted with an explosion relief assembly should be inspected weekly to ensure the bursting panels are intact and clear of obstruction. During winter, particular care must be taken to prevent build-up of snow or ice on explosion panels.

Servicing schedule

A record of all pressure checks should be kept in a log book to aid the speedy diagnosis of faulty operation.

Daily

1. Check level of contents in dust container and empty if ¾ full.

Weekly

1. Open valve at the bottom of moisture separator bowl and allow collected water to drain off, then close valve.

2. Check the pressure drop across the filter by viewing the display on the front panel of the controller. If excessive, refer to Table 1.

Every 2 weeks

1. Check for visible effluent from cleaned air outlet. If evident, refer to Table 1.
2. Check controller settings (refer to controller manual).

Monthly

1. Check dust seals on all access panels for damage or ageing and ensure they are properly seated to prevent entry of water. This is particularly important where the collector is located outside or in a wet atmosphere.

   Faulty seals must be replaced.

2. Check operation of solenoid and diaphragm valves. If it is found necessary to replace a diaphragm, refer to Valve disassembly/reassembly.

   It may be necessary to check operation of the valves while the system is pressurised. Care should be taken to avoid injury.

Every 2 months

1. Check connected ducting. Repair any leaks as necessary.
2. Visually check explosion panel (if fitted). Replace if damaged, corroded or leaking.

Every 6 months

1. Check general casing integrity and support structure. Repair or replace as necessary.
2. The fan impellor has been dynamically balanced and the fan assembly vibration level should be in line with category BV-3, ISO 14694. An assessment of vibration should be made every six months, or after a significant emission, or after any misuse and a record kept of measured values. Excessive vibration levels should be investigated and corrected immediately.

   Vibration monitoring is mandatory on category 2G, 3G and 2D fan assemblies.

Annually

1. Remove and clean moisture separator filter element.
2. Remove drain plug and air inlet connections from compressed air manifold. Clean out any accumulated sludge and inspect to any current local legislation.

   It may be necessary to remove a diaphragm valve for internal inspection purposes.

3. If applicable, check all flameproof enclosures, motors and cable glands for corrosion and tightness.

   In particularly aggressive environments, this period should be more frequent.

4. If applicable, check collector earthing continuity.
5. If applicable, check measures taken to avoid ignition sources are still in place.
6. Open the clean air chamber access cover and, by looking through fan inlet eye,

inspect fan thoroughly. If necessary, remove all residual dust accumulation. (Although the fan is located on the clean side of the collector, it is possible for low quantities of dust to migrate through the filter media).

The fan should be inspected immediately after any period of significant dust emission, i.e. due to damaged filter media or seal etc.

The fan should be inspected immediately if there is any unexpected noise, temperature or vibration.

The fan should be inspected every twelve months or immediately following any misuse.

If inspection reveals any damage then the fan must not be put back into service until properly repaired or replaced.

Every 2 years

Replace filter cartridges (unless specified otherwise in Scope of Delivery). Refer to Filter cartridge replacement.

Valve disassembly/reassembly

Do not overtighten pipe connections.

Refer also to figure 14.

1. Using screwdriver unscrew 4 screws to remove bonnet from valve.
2. Diaphragm assembly is now accessible for cleaning or replacement.

When replacing diaphragm assembly ensure the marking "THIS SIDE OUT" faces valve bonnet and bleed hole is in alignment with cavity in vlave body and bonnet. The external contours of diaphragm, body and bonnet must all be in alignment.

3. Replace bonnet and tighten screws.

Torque 7 Nm (±1). Torque should be applied crosswise.

4. After maintenance, operate valve a few times to ensure proper operation.

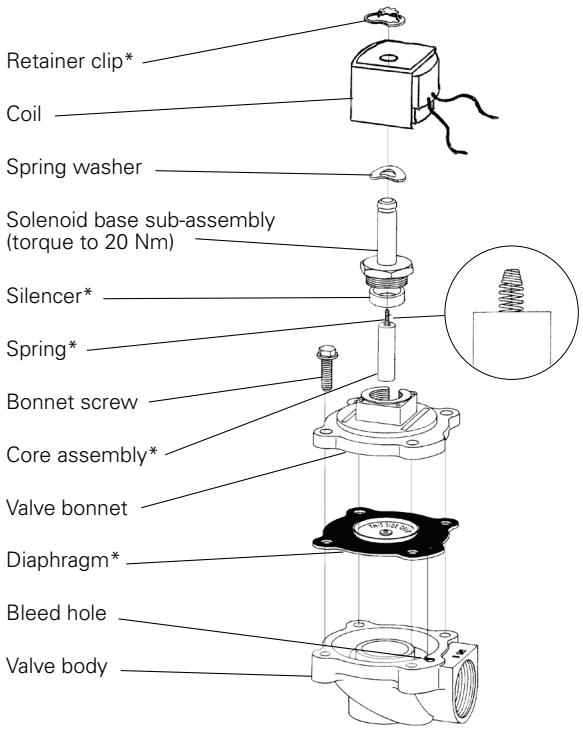


Figure 14: Diaphragm valve
*Included in diaphragm valve service kit

Filter cartridge replacement

All filter cartridges should be changed at the same time.

Removing cartridges requires the use of safety and protective equipment.

Filter cartridges cannot be washed and re-used.

Do not drop cartridges.

Refer also to figure 15.

1. Open contaminated air chamber access door.
2. Remove filter cartridge cover by unscrewing wing nut anticlockwise.
3. Slowly rotate cartridge from side to side to remove dust that may have accumulated on top of cartridge.
4. Slide cartridge out of collector along suspension yoke.

Dirty cartridges may be heavier than they appear.

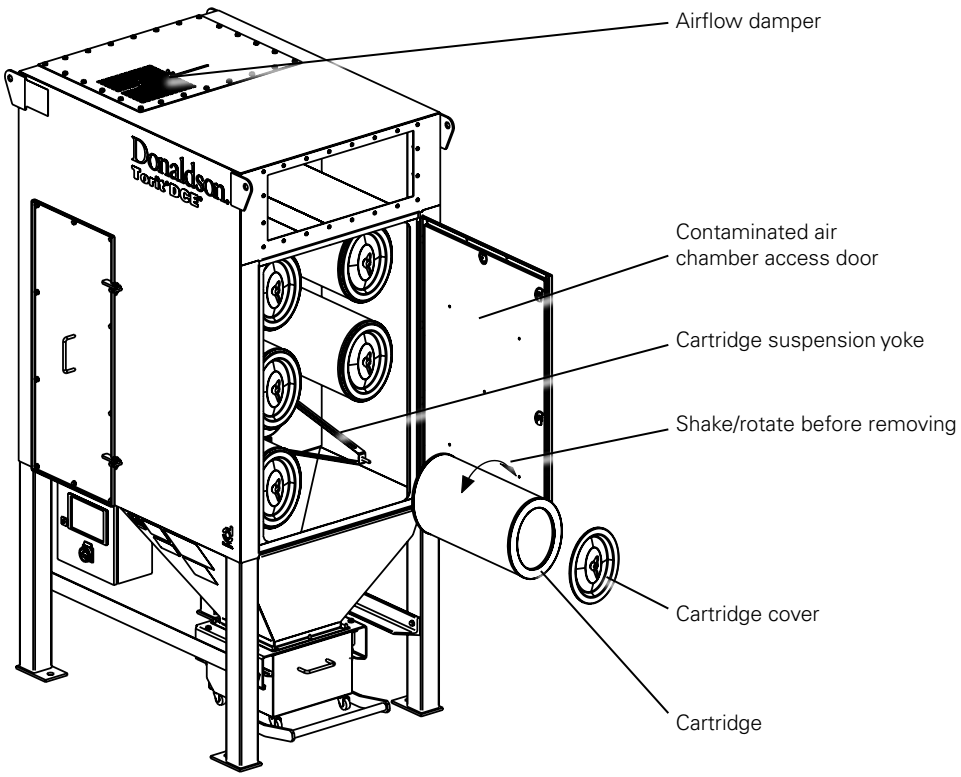


Figure 15: Cartridge replacement

5. Place cartridge into a sealable bag and dispose of the cartridge properly.

   If in doubt regarding safe disposal of used cartridges, consult your local regulations.

6. Clean sealing surfaces with a damp cloth.

   Surface around opening on seal frame must be clean to ensure an airtight cartridge seal.

7. Slide new cartridge onto suspension yoke.

   Insert seal-end first.

8. Wipe clean cartridge cover seal and replace cover. Tighten wing nut securely, by hand.

   Do not use tools to tighten wing nut.

   Check cover is seated and sealed properly. Seal must be compressed to ensure it is airtight.

   Damaged seals must be replaced.

9. Wipe clean contaminated air chamber access door seal.

10. Close contaminated air chamber access door.

Ensure airflow damper is half-closed before restarting collector.

Fan assembly removal

 *Isolate electrical power supply.*

1. Open clean air chamber access door.
2. Disconnect electrical cables from terminal box.
3. Remove fan securing bolts.
4. Remove airflow damper panel or fan box from top of collector, if applicable.
5. The fan assembly can now be removed using a suitable lifting arrangement.

TABLE 1 – FAULT LOCATION

Symptom	Possible cause	Action
Part loss of suction (excessive pressure differential).	Compressed air malfunction.	If compressor stopped, rectify compressor fault; check interlocks; check motor and supply; check drive.
		If compressor OK, check pulses at manifold pressure gauge.
		Clean filters, dismantle and clean moisture separator.
		Check for excessive water or oil in compressed air supply, and possible accumulation in manifold.
	No pulses of air to valves.	Refer to 'Fault location' table in controller manual supplied with dust collector.
	Unit blocked.	Check dust container is not overfull. Check starter overloads, fuses and interlocks.
		Run unit clear*, then remove each cartridge in turn and renew any that are damaged.
	Motor speed low.	Check line voltage, phases, fan motor connections.
	Incorrect fan motor rotation.	Check electrical connections and transpose if necessary.
	Airflow damper incorrectly adjusted	Check airflow in duct. Adjust damper control until correct airflow is achieved.
	Access panels open or incorrectly secured	Check all access panels are in place and correctly secured. Ensure dust container is properly sealed.
	Fan exhaust area restricted	Check fan exhaust area for obstructions.
Total loss of suction.	Fan motor stopped.	Check motor supply overloads, fuses and interlocks (if fitted).
		Check motor connections and windings.
	Unit blocked.	Check that dust container is not overfull. Check starter overloads, fuses and interlocks.
		Run unit clear*, then remove each cartridge in turn and renew any that are damaged.
	Ducting blocked.	Check throughout and clear.
Visible effluent in clean air outlet.	Filter cartridges not properly sealed.	Check cartridge access covers are seated and seal properly.
	Damaged filter cartridge.	Damaged cartridges can be identified by the dust present in clean air chamber. Withdraw cartridge and renew.

*To run unit clear, switch off main fan only and allow the controller to perform several complete cleaning cycles before switching off compressor etc.

This procedure is not recommended where explosion panels are fitted, as damage could result to the Membrex membrane. In such cases consult with Donaldson.

TABLE 1 – FAULT LOCATION (CONTINUED)

Symptom	Possible cause	Action
Total loss of suction.	Fan motor stopped.	Check motor supply overloads, fuses and interlocks (if fitted).
		Check motor connections and windings.
	Unit blocked.	Check that dust container is not overfull. Check starter overloads, fuses and interlocks.
		Run unit clear*, then remove each cartridge in turn and renew any that are damaged.
	Ducting blocked.	Check throughout and clear.
Visible effluent in clean air outlet.	Filter cartridges not properly sealed.	Check cartridge access covers are seated and seal properly.
	Damaged filter cartridge.	Damaged cartridges can be identified by the dust present in clean air chamber. Withdraw cartridge and renew.
Dust container pressure balance (if fitted) not working.	Sock filter blocked.	Clean sock filter.
	Leaking balance pipe connection.	Check connections and rectify.
Excessive noise from diaphragm valve.	Diaphragm valve failure.	Check for debris, obstruction, valve wear or diaphragm failure. Replace damaged valve or parts.

*To run unit clear, switch off main fan only and allow the controller to perform several complete cleaning cycles before switching off compressor etc.

This procedure is not recommended where explosion panels are fitted, as damage could result to the Membrex membrane. In such cases consult with Donaldson.

SPECIFICATION

For other specifications on this product refer to Publication 2707.

For controller specifications refer to controller manual.

TABLE 2 – COMPRESSED AIR MANIFOLD DESIGN DETAILS

Design pressure:	7 bar (101.5 psig)
Maximum operating pressure, PS:	7 bar (101.5 psig)
Test pressure:	10.3 bar (149.3 psig)
Design temperature:	-10° to +65°C
Maximum rating of pressure relief device:	17 dm^3/s at 6.9 bar (not supplied as standard)
Manifold volume:	5.8 litres (DFPRO 4) 9.5 litres (DFPRO 6 and DFPRO 12) 13.2 litres (DFPRO 8 and DFPRO 16)
Product of pressure and capacity:	40.6 bar litres (DFPRO 4) 66.5 bar litres (DFPRO 6 and DFPRO 12) 92.4 bar litres (DFPRO 8 and DFPRO 16)
Material used for manifold construction:	Structural hollow section
Minimum metal thickness before manifold requires special inspection:	5 mm

1 bar = 10^5 Pa

TABLE 3 – COMPRESSED AIR REQUIREMENTS

Collector type	Working compressed air pressure [a]	Atmospheric air volume- F.A.D. [b]	Pulse duration	Minimum pipe diameter [c]
		at 12 sec. intervals [b]		
DFPRO 4-16	6 bar 87 psig	13.5m^3/h	100 ms	1/2" NB (25)

[a] Normal operating pressure. [b] Recommended initial settings; these may be varied with experience.
[c] Sizes suitable for runs of pipe up to 30 m (100ft) in length; for longer runs consult with Donaldson.

1 bar = 10^5 Pa

SPARE PARTS LIST

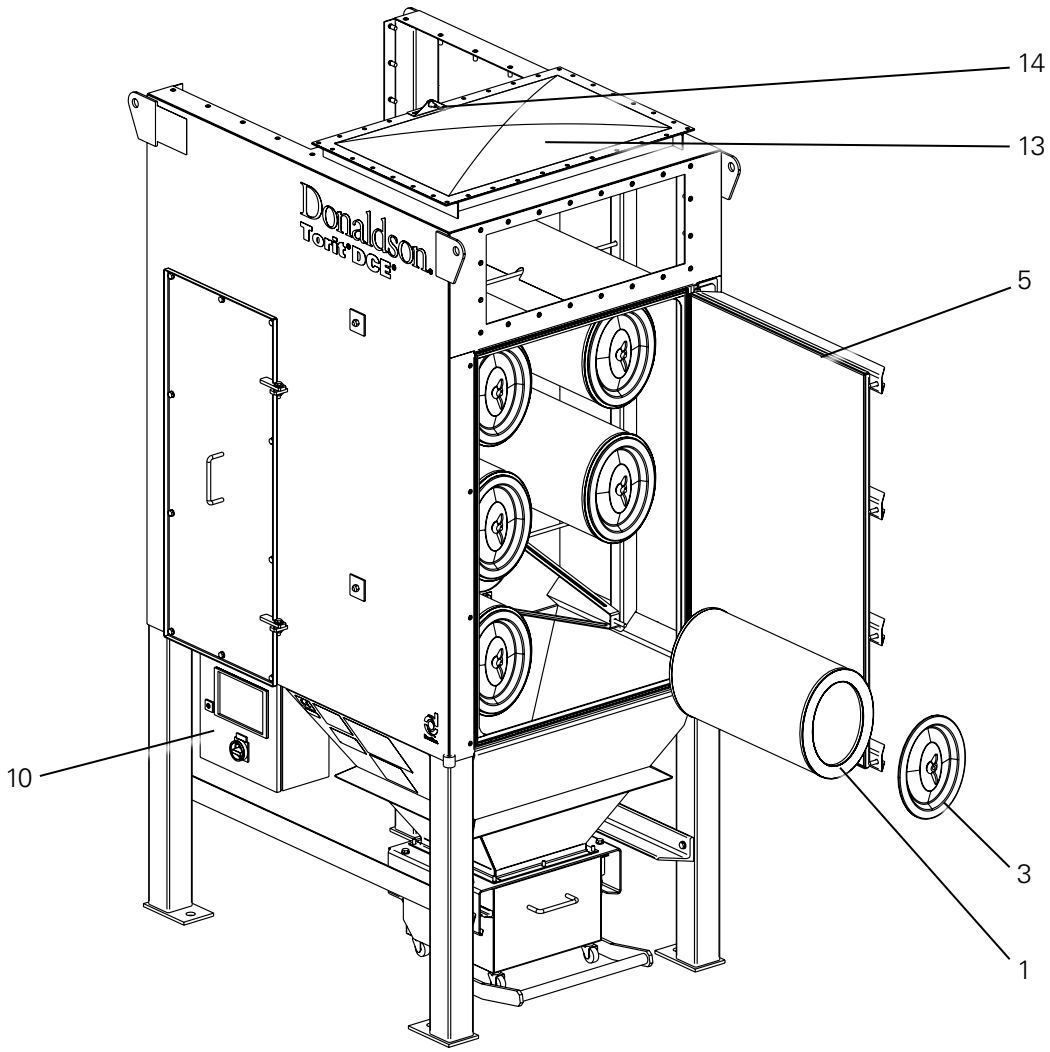
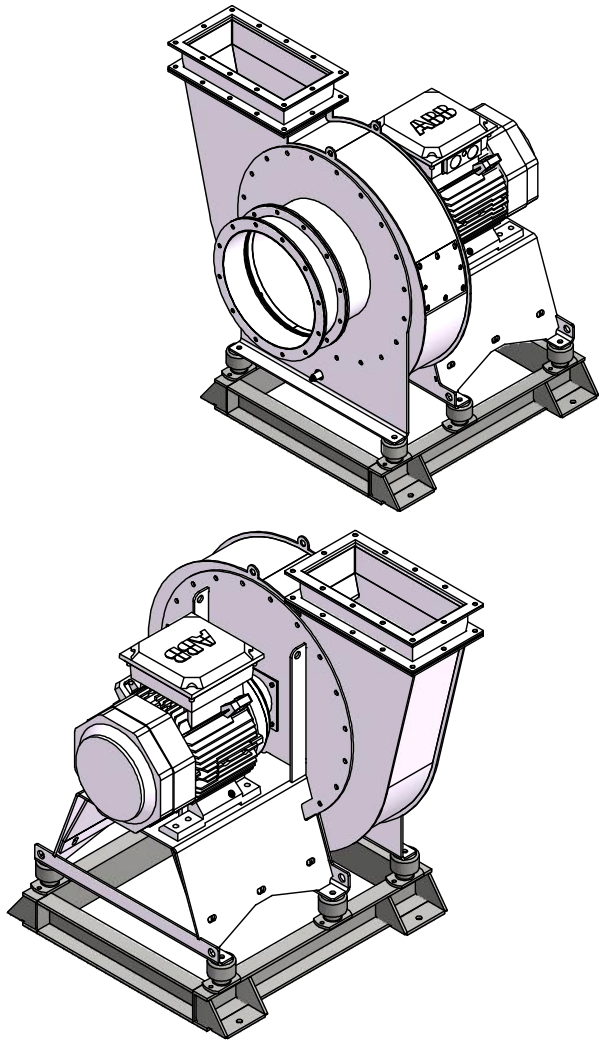


Figure 16: Spare parts identifiction

SECTION NO. 3.

FAN SET

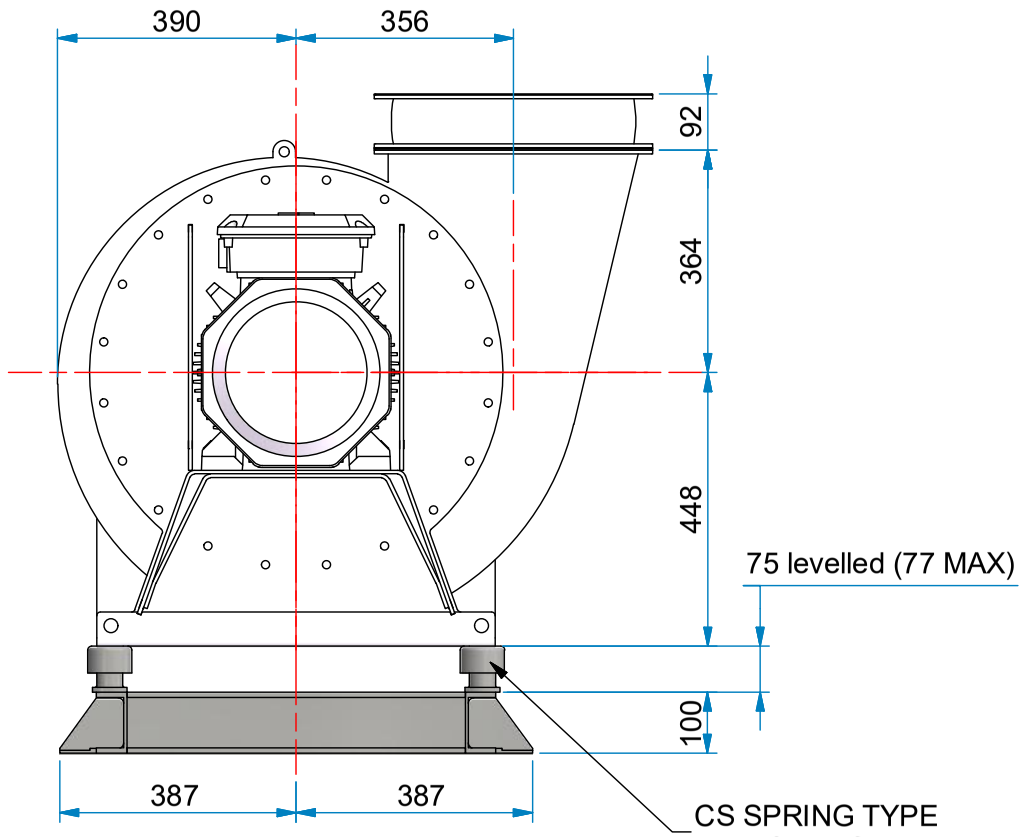
LUGS INTEGRAL TO CASE SIDE PLATES ARE FOR MANUFACTURER USE ONLY - NOT FOR ASSEMBLY LIFTING

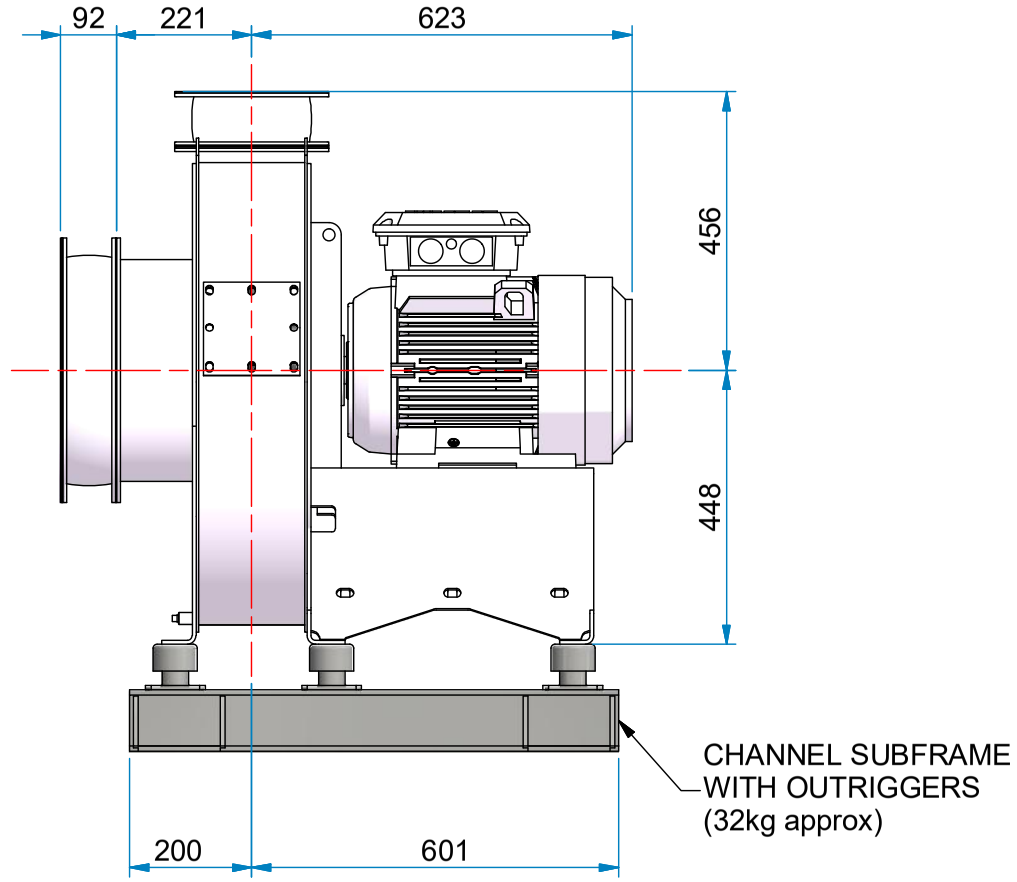


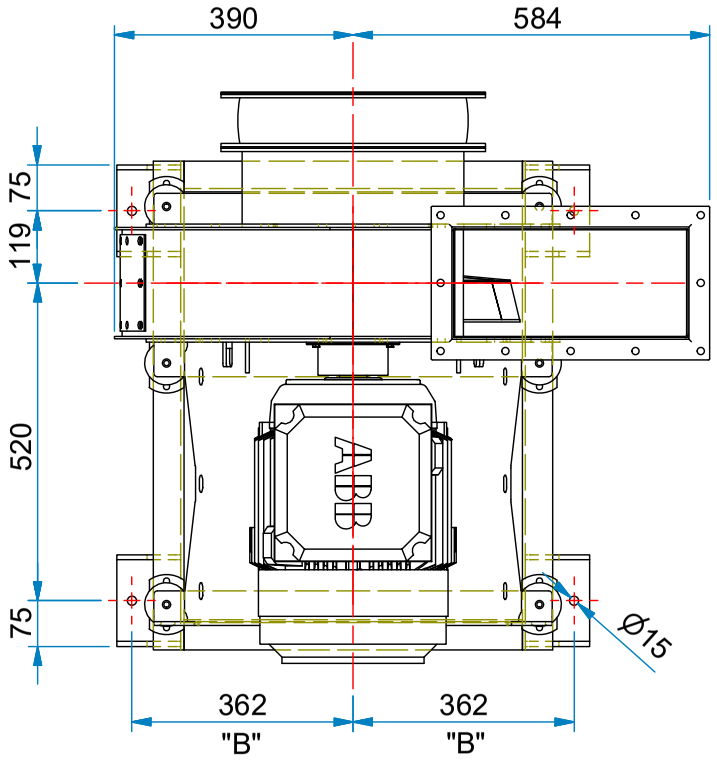
FAN MANUFACTURING DETAILS	
Approximate Fan Weight	289 kg
Maximum Design Temperature	50 °C
Fan Casing Material	S275
Pedestal Material	S275
Impeller Material	Mild Steel

FAN ANCILLARIES			
ATEX Certified Int.	No	Drain Socket	1/4" BSP
ATEX Certified Ext.	No	Inlet Flexible	Yes
Anti-Spark Features	No	Outlet Flexible	Yes
Cooling Disc & Guard	No	Inlet Guard	No
M10 Earthing Boss	No	Outlet Guard	No
Vibration Monitor	No	Access/Balance Hatch	Yes

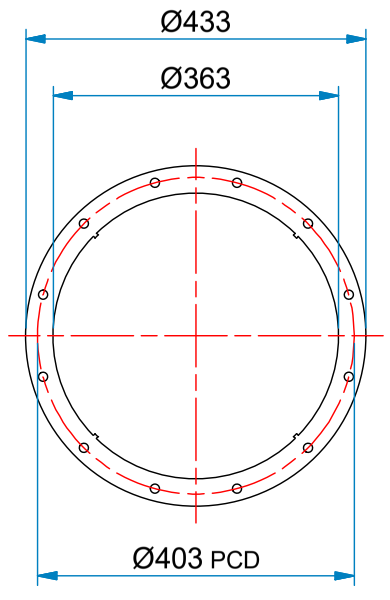
MOTOR DETAILS	
Manufacturer	ABB
Frame Size	160ML
Rated Power Output	11kW
Pole Qty	2
Power Supply	400V / 3ph / 50Hz
Enclosure / IP Rating	TEFC / IP55
Efficiency Class	IE3
Area Classification	Safe Area



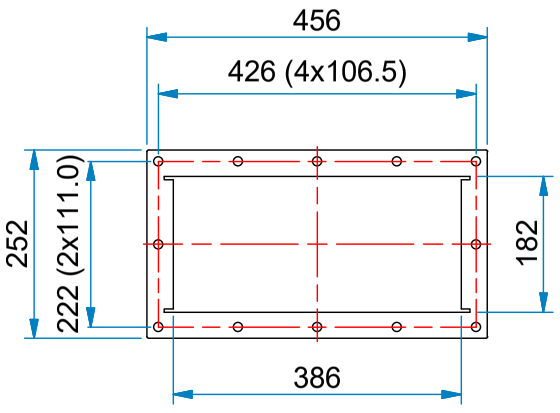




INLET & OUTLET FLEXIBLE CONNECTIONS
WITH BACKING FLANGES & LINER SLEEVES



INLET FLANGE DETAIL
(12x Ø12 OFF CTRS)



OUTLET FLANGE DETAIL
(12x Ø12)

Rev "B" was 352
Rev "A" AV Mount position changed

halifax fan
England's leading fan manufacturer
Halifax Fan Ltd., Brookfoot Business Park, Elland Road, Brighouse HD6 2SD
Telephone : (01484) 475123 Fax : (01484) 475122 Email: sales@halifax-fan.co.uk

FIRST ANGLE PROJECTION

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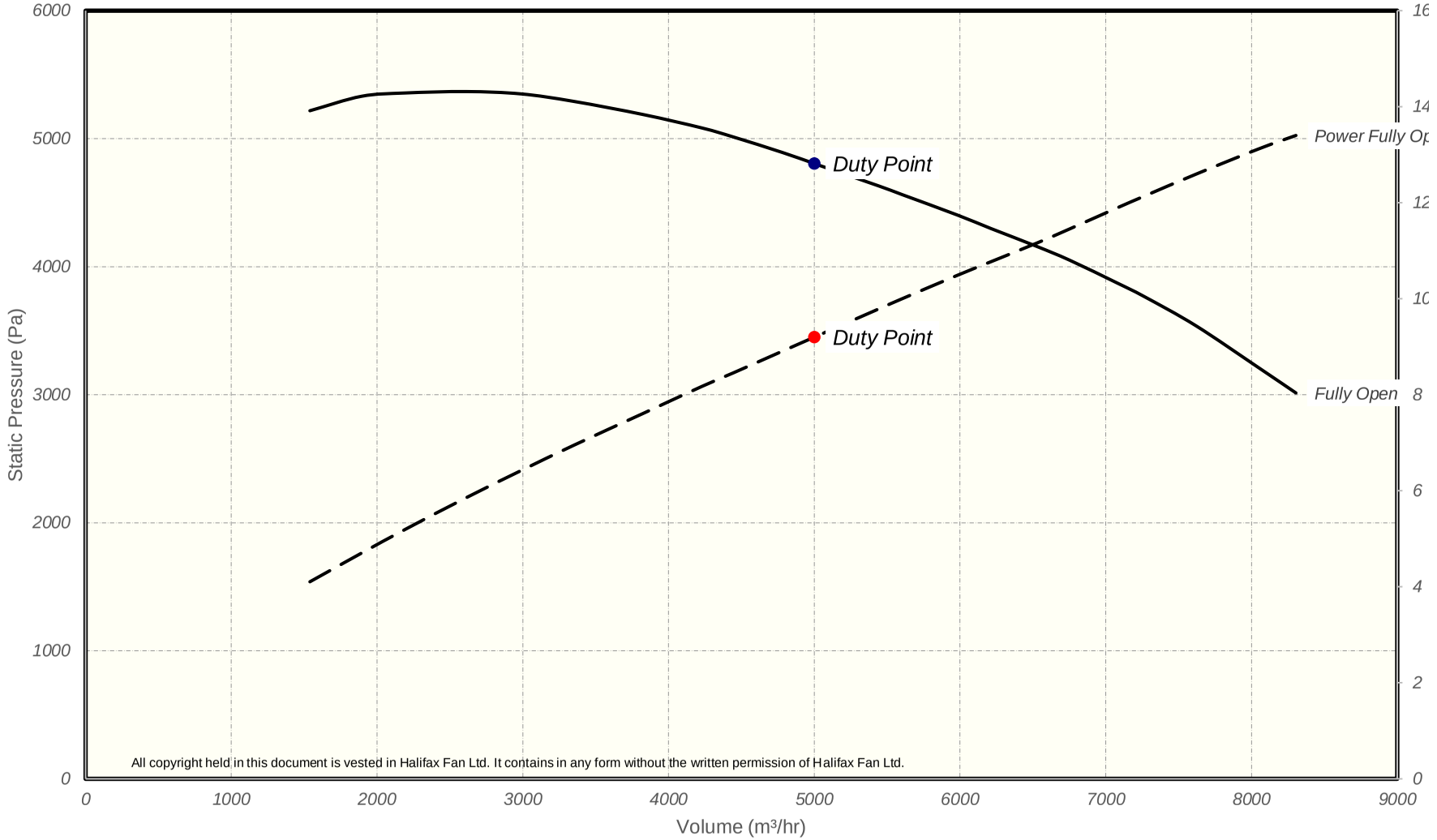
Drawing Type: General Arrangement
Item Type: Fan
Product Type: Chinook "B" BI
Fan Size: 21.5
Driving Arrangement: 3P
Handing: L90
All Dimensions Are In mm Unless Otherwise Stated. Do NOT Scale. If In Doubt, Ask

Drawn	AW	Drawing Number	Rev
Date	11/06/2020	CB21.5_72423	B
Checked			
Customer	Duscovent Engineering Ltd		
Customer PO No.	DE 30870 / 3052 / BT		
Job No.	72423	Quantity	1

Performance Data for Halifax No. 21.5 Chinook 'B' Backward Inclined Fan

halifax fan
engineering masterpieces
Halifax Fan Ltd.
Brookfoot Business Park, Brighouse, W
United Kingdom, HD6 2SD
e: sales@halifax-fan.com
t:+44 1484 475 123

	Operating Conditions		Fan Speed	2938 RPM	Gas Density	1.2 kg/m³
Duty	Volume	5000 m³/hr	Static Pressure	4805.52 Pa	Power	9.2 kW



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PLOT BY -LeighPrescott Date -28/01/2020 CURVE NUMBER -

EU DECLARATION OF CONFORMITY

The declaration of conformity is issued under the sole responsibility of Halifax Fan Ltd.

Quantity **1** Description:- **Size 21.5 CBBI Fan, Handing L90, Direct Drive Arr. 3P, 11 KW 2 Pole motor**

ATEX Area Classification :- **Safe Area**

Fan Serial Number	**72423**	Rated Speed	**2938** RPM
Size and Type	**21.5 CBBI**		
Year	**2020**		

Maximum Inlet Temperature **50** °C Rotation Viewed from Motor **CCW**

The fan of the declaration described above is in conformity with European Union harmonization legislation:-

EU Directive 2006/42/EC (Machinery Directive). The following harmonized standards are applied in relation to which, unless by explicit exclusion (see Note 1), conformity is declared:

BS EN 349:1993 + A1:2008, ISO 12100:2010, ISO 13857:2008, ISO 14120:2015
Regulation 327/2011 implementing EU Directive 2009/125/EC (Eco Design of Fans). The fan will operate within tolerance grade AN3 as laid down in ISO 13348:2007.
EU Directive 2014/30/EU (EMC)
EU Directive 2011/65/EU (Hazardous Waste in Electrical Products)
The conformity of the end product according to EU Directive 2006/42/EC has to be established by the commissioning party when the fan is fitted to the machinery.

Note 1: The fan casing inlet and discharge are excluded from conformity to EU Directive 2006/42/EC. Guarding where fitted to the inlet and/or discharge is to prevent contact with the impeller and prevent significant objects passing through the fan only. If no casing is supplied, the impeller is excluded from conformity to EU Directive 2006/42/EC.

Note 2: The fan must be installed and maintained according to the relevant standards and instructions of Halifax Fan Ltd.

Certified that the equipment/components detailed hereon have been inspected and tested in accordance with the conditions and requirements of BS EN 9001:2015 and unless otherwise noted, conform in all respects to the specifications and drawings relevant there to.

Signed: ..... **Date:** 15/07/2020

Name: A. Welbourne **Position:**

Halifax Fan Ltd
Mistral Works, Unit 11, Brookfoot Business Park,
Elland Road, Brighouse, West Yorkshire, HD6 2SD, UK
t: +44 1484 475 123
e: sales@halifax-fan.com w: www.halifax-fan.com
Registered in England No: 2960571

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Halifax Fan Limited is registered to BS EN ISO 9001

Halifax Fans are designed with Quality and Safety in mind. In addition, they are: -

Tested and Performance Rated to ISO 13348:2007: Type D.

Balanced to within the limits of:
BS ISO 21940-11:2016, Grade G6.3 or better.

Vibration levels conform to BS 848-7:2003/ BS ISO 14694:2003

Machinery Directive	2006/42/EC
EMC Directive	2014/30/EU
ATEX Directive	2014/34/EU
Eco-Design Directive	2009/125/EC

Document Version Number: 1.14 **Release Date: 25/06/2019**

GENERAL NOTES

This document should be read in full, by the appropriate personnel prior to installation/commissioning.

It is assumed that the fan is installed and commissioned upon receipt. If this is not the case and the fan is put into storage, ensure that section 8 is adhered to with respect to the fan storage.

Please be aware that your fan is bespoke and therefore there will be sections in this manual which are not specifically applicable to your fan.

DISCLAIMER

Every care has been taken in the preparation of the instructions and information given on the following pages. However, it is the responsibility of the company installing the fan to ensure the system complies with the relevant national and international laws.

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1. Contact Details

UK SITE (HEAD OFFICE) :

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BRIGHOUSE

WEST YORKSHIRE HD6 2SD

T. +44 (0) 1484 475 123 EMAIL: SALES@HALIFAX-FAN.COM

WEBSITE: www.halifax-fan.com

Note: To assist in handling of any request for information or assistance, prior to contacting Halifax Fan, please obtain the fan serial number and fan type from the fan nameplate.

HALIFAX FAN UK CONTACT NUMBER: +44 1484 475 123

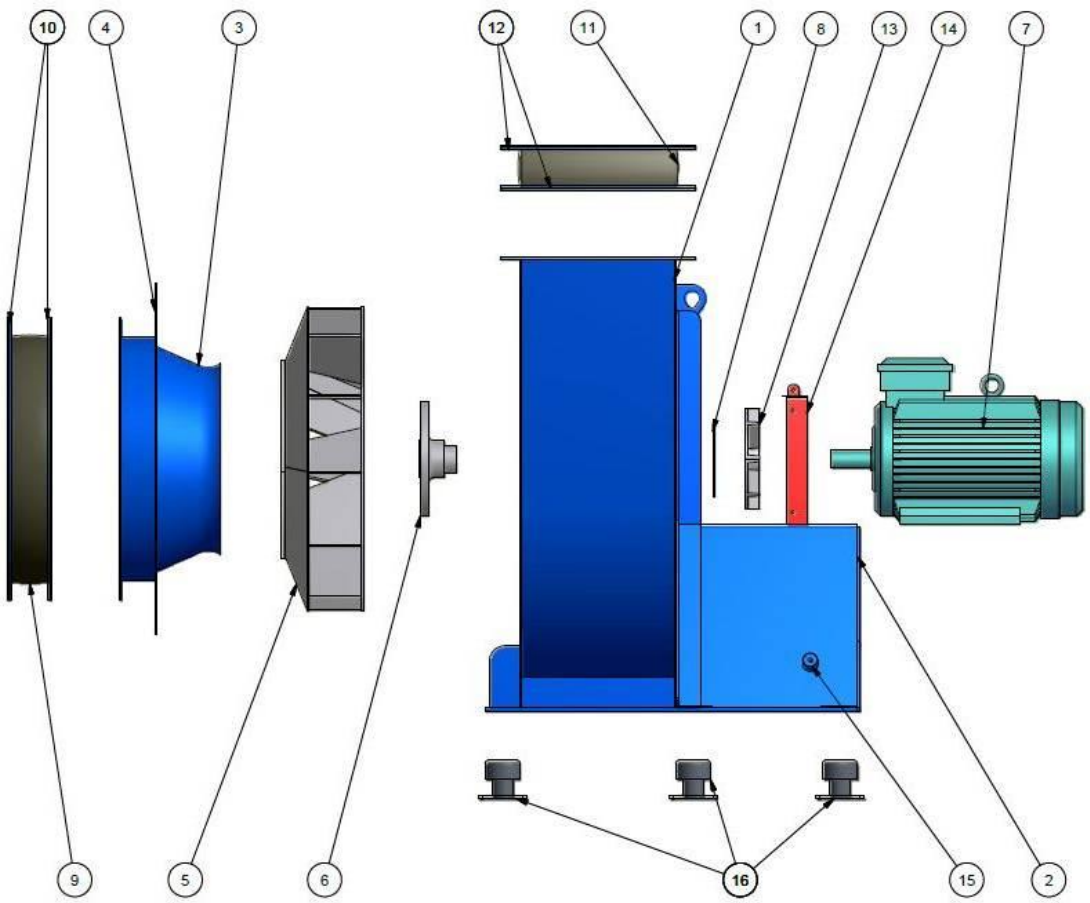
HALIFAX FAN CHINA CONTACT NUMBER: +86 755 8149 0039

HALIFAX FAN USA CONTACT NUMBER: +1 330 923 8351

HALIFAX FAN THAILAND CONTACT NUMBER: +66 2744 3193 – 4

2. Typical Arrangements

2.1 Direct Drive



ARRANGEMENT 3 FAN	
PART	DESCRIPTION
1	Fan Casing
2	Fan Pedestal
3	Inlet Cone
4	Front Plate
5	Impeller
6	Impeller Centre Boss
7	Motor
8	Shaft Seal
9	Inlet Flexible Connection (Opt.)
10	Inlet Flexible Backing Flange (Opt.)
11	Outlet Flexible Connection (Opt.)
12	Outlet Flexible Backing Flange (Opt.)
13	Cooling Disc (Opt.)
14	Cooling Disc Guard (Opt.)
15	Earthing Boss (Opt.)
16	AV Mount (Opt.)

Star-Delta

If a motor is wired for star delta start-up there will be six wires plus an earth connection. The running current is the average readings at all connections multiplied by √3. (1.732). A drawback with this method of starting is the low starting voltage and consequently low start-up torque. This needs to be considered when sizing motors for use on high inertia applications such as fans.

Inverter (VSD)

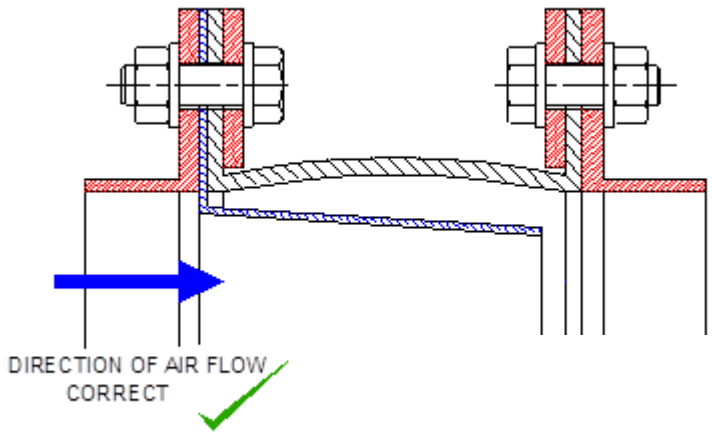
Generally wired as per DOL. An inverter or variable frequency drive (VSD) starts a motor at low frequency whilst making full rated torque available without high start-up currents. Starting current should not go above the motor FLC if the inverter is correctly set-up to protect the motor against winding damage.
Consult the VSD manufacturer's instructions.

Soft Starters

The use of soft starts on fan drives should be fully investigated to obtain correct sizing of motor starter. Please consult our technical department for further details.

In the event of a claim under warranty, we would require evidence in the form of a commissioning certificate (See Appendix A as a guide) that a qualified engineer had carried out the necessary procedures and established that the fan bearings and grease, belts and motors were in a satisfactory condition on commissioning.

Flow Sleeves (if fitted for high flow velocity / dust applications)



When flow sleeves are fitted, ensure they are positioned correctly relative to the air flow direction. Air must flow into the sleeve as shown.

4.7 Vibration

The following table is a guide to the correct vibration limits once fans are installed. They are based on BS 848-7:2003 and BS ISO 14694:2003.

Application		**Start Up**	**Alarm**	**Shutdown**
		r.m.s	**r.m.s**	**r.m.s**
Industrial Processes	Rigidly Mounted (mm/s)	4.5	7.1	9.0
	Flexibly Mounted (mm/s)	6.3	11.8	12.5
Petrochemical & Marine **< 37kW**	Rigidly Mounted (mm/s)	4.5	7.1	9.0
	Flexibly Mounted (mm/s)	6.3	11.8	12.5
Petrochemical & Marine **> 37kW**	Rigidly Mounted (mm/s)	2.8	4.5	7.1
	Flexibly Mounted (mm/s)	4.5	7.1	11.2

Please refer to Appendix C Commissioning Record sheet.

4.8 Bearing Temperature

Fans are used in many different types of applications ranging from high temperature industrial process fans, fans exposed to either high or very low ambient temperatures, as well as, what might be defined as 'normal' conditions i.e. zero to 40 °C ambient, standard air handling.

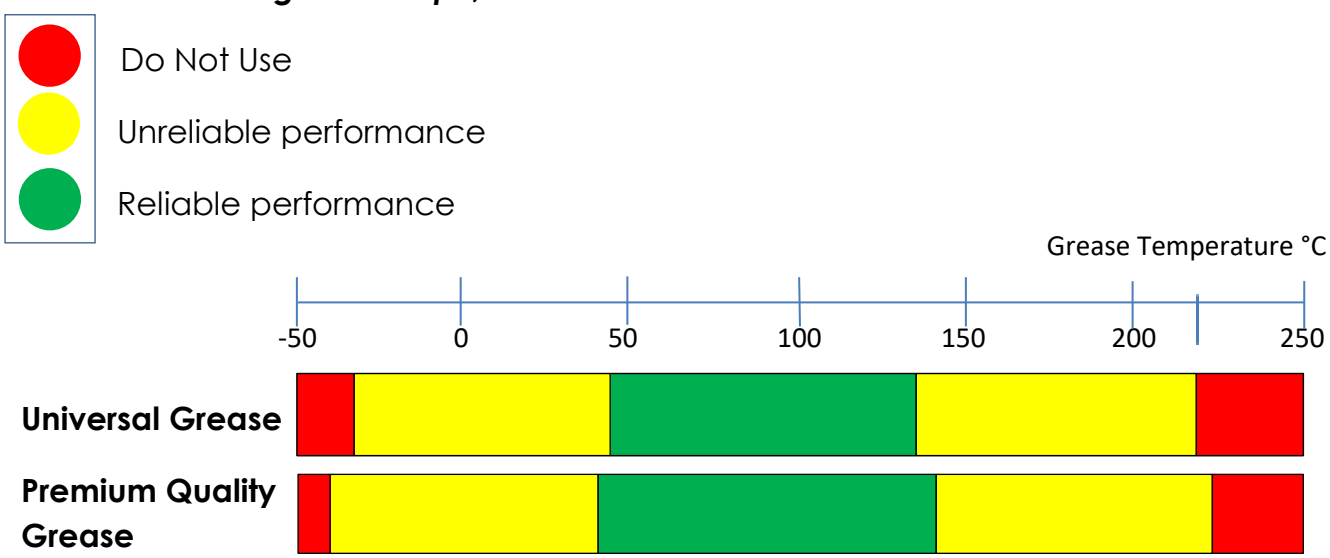
We also produce fans ranging from less than 1000rpm to over 4000rpm, 0.55kW to over 1MW in power.

As such, the expected bearing operating temperatures will vary, taking into account speed, power transmitted, vibration, ambient temperature and fan process air temperature. The standard Halifax Fan greases have been selected for their excellent lubrication performance over a wide temperature range.

It is not possible to accurately define expected bearing operating temperatures. We adopt the industry recognised *SKF traffic light concept* for operational temperature limits of the lubricant.

In all cases it is important to ensure vibration is within the limits recommended and that for high temperature fans, the method of bearing temperature protection is satisfactory (this is generally an aluminium cooling impeller mounted on the fan shaft between the in-board bearing and the fan side).

4.8.1 SKF traffic light concept ;



A universal grease combines a mineral oil base fluid with a lithium complex soap thickener. It is excellent at temperature, has good corrosion protection and good mechanical stability combined with high load carrying capacity.

A premium quality grease which combines a synthetic base fluid with a lithium complex soap thickener. This is particularly suited for higher speed bearing applications.

4.8.2 Expect bearing operating temperatures

It is normal for bearing operating temperature to be up to 60°C above ambient.

Initial operating conditions should be well within the green bands. Over 100°C operating temperature the grease life may be reduced.

4.8.3 Bearing Temperature Alarm and Shutdown settings

New bearings generally go through a 'bedding in' process where temperatures gradually rise, peak and stabilise. This process generally lasts between 1 and 4 hours. It is recommended that once each bearing has stabilised and 'normal running' temperature values have been established for the entire fan operation cycle, that these readings are recorded and used as a base for alarm and shutdown settings. It is important that during the 'bedding in process' and subsequent trip settings, that the operational temperature limits of the lubricant are not exceeded.

Alarm : set at 10°C above 'normal running' temperature value
Shutdown : set at 20°C above 'normal running' temperature value
Note : 'Normal running' temperature should allow for variations in ambient conditions.

5. Maintenance

5.1 Routine

Do not attempt any maintenance on a fan unless the electrical supply has been locked out or tagged out and the impeller has been secured.

Maintenance should always be performed by experienced and trained personnel.

The bearing life of the fan will be extended if the impeller is kept clean. Any build-up of dirt on the impeller will eventually create a degree of imbalance. This causing vibration which indicates that dynamic load is being applied to the bearings and impeller. The service period between cleaning shut downs will vary depending upon the fan application, but a regular maintenance program should be established, as required, to prevent any dirt accumulating on the impeller.

Periodic inspection (depending on the level of instrumentation and process conditions) of rotating components must be made to detect any indication of weakening of the rotor because of corrosion, erosion, or metal fatigue. A preventive maintenance program is an important aspect of an effective safety program. Investigate any changes to the fan. Consult our technical department with any questions concerning changes observed during periodic inspections.

5.2 Component Maintenance

We use a variety of bought out components, including anti-vibration mounts, couplings, motors, seals, acoustic enclosures etc. We will make all our suppliers IOM manuals available on request, please ensure you refer to the specific manufacturer's literature before undertaking any maintenance.

Shaft Seals

Halifax Fans standard shaft seal is a compressed fibre rubbing seal which requires minimal maintenance. You should check the seal every 12 months to ensure it is clean and if damaged it should be replaced.

We do however use a wide variety of shaft seals, please contact our technical department for further information.

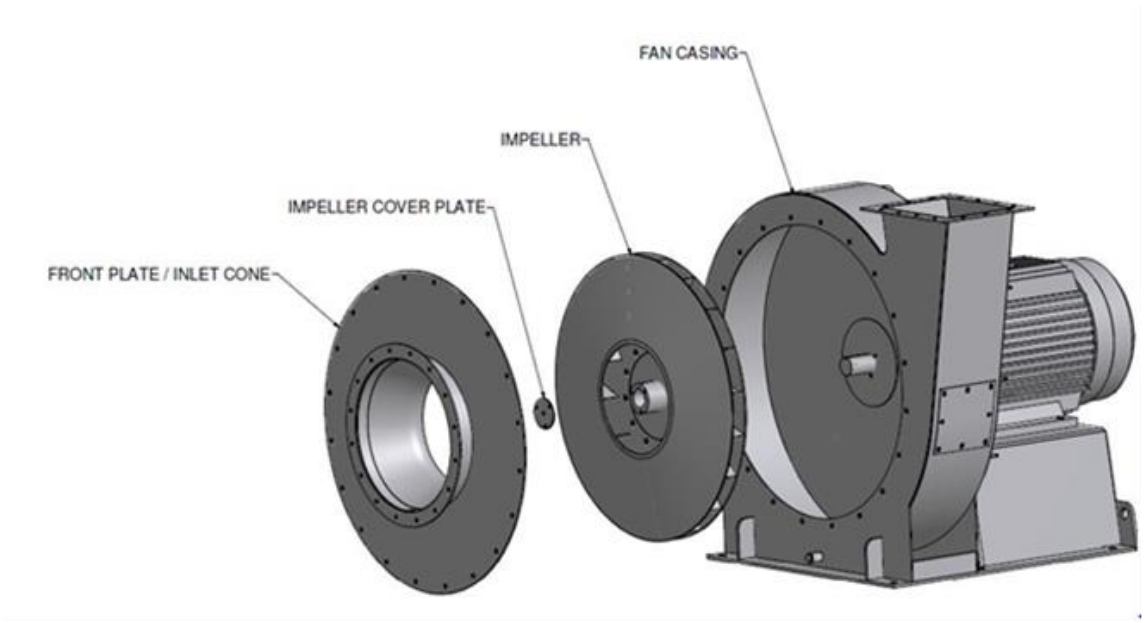
5.3 Impeller Removal

To investigate problems with your fan it may be necessary to remove the impeller. This can be done by following the steps below.

The impeller is fixed to the shaft with either a parallel key and cover plate or a taper key.

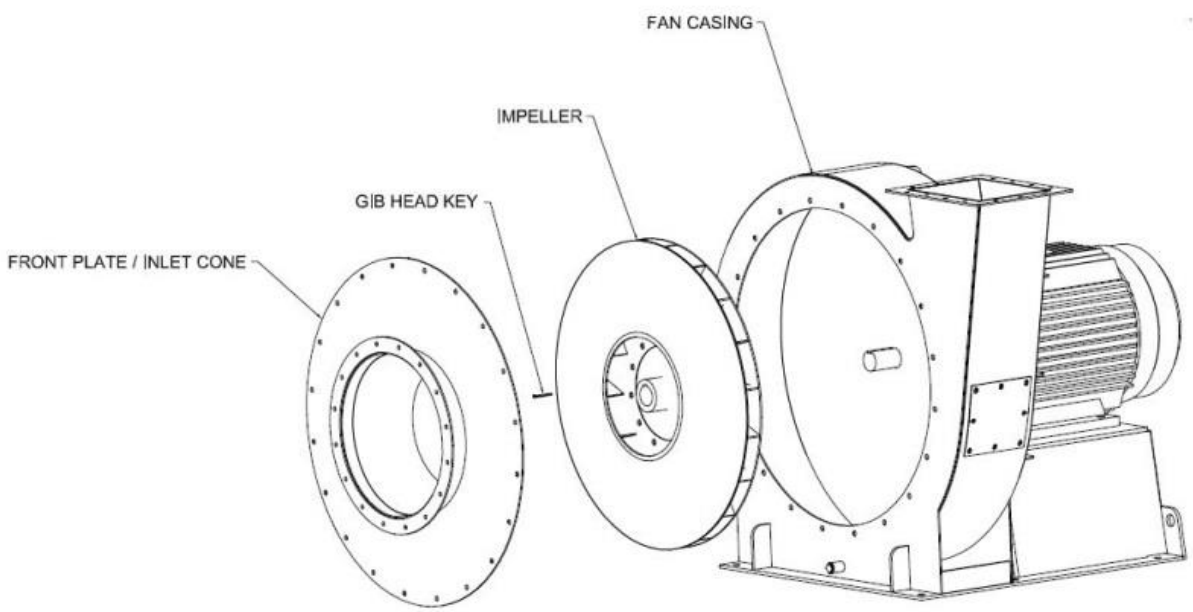
5.3.1 Impeller removal for fans with a parallel key and cover plate:

- Isolate and lock off power to the fan.
- Remove adjacent ductwork to allow access to the fan inlet.
- Mark existing position then remove front plate/inlet cone assembly.
- The impeller can now be pulled off the motor shaft and withdrawn from the fan casing.
- Reverse the process for assembly, fixing the front-plate back in its original position.
- Carefully spin the impeller by hand to check for fouling.



5.3.2 Impeller removal for fans with a taper key:

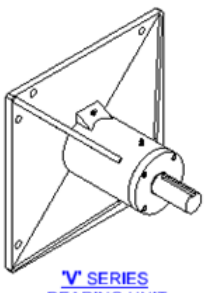
- Isolate and lock off power to the fan.
- Remove adjacent ductwork to allow access to the fan inlet.
- Mark existing position then remove front plate/inlet cone assembly.
- Remove the taper key with a slide hammer (a video showing the taper key removal is available via our website, on our You Tube channel).
- The impeller can now be pulled off the motor shaft and withdrawn from the fan casing.
- Reverse the process for assembly, fixing the front-plate back in its original position.
- Carefully spin the impeller by hand to check for fouling.



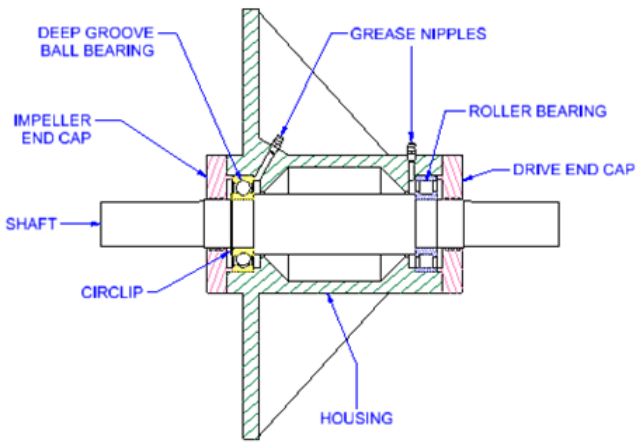
5.4 Lubrication

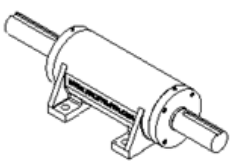
The lubrication instructions in this section are only applicable to the bearings in the Halifax Fan bearing housings provided with our belt driven & direct in line fans. **For direct drive fans and for lubrication of different bearings and motor bearings please consult the respective supplier's manual.**

Halifax Fan bearing units come in a 'V' Series and an 'M' series; both are fitted with 2 grease nipples, one for each bearing, and can be re-greased while the fan is running. See the typical diagrams below to identify the location of the grease nipples.

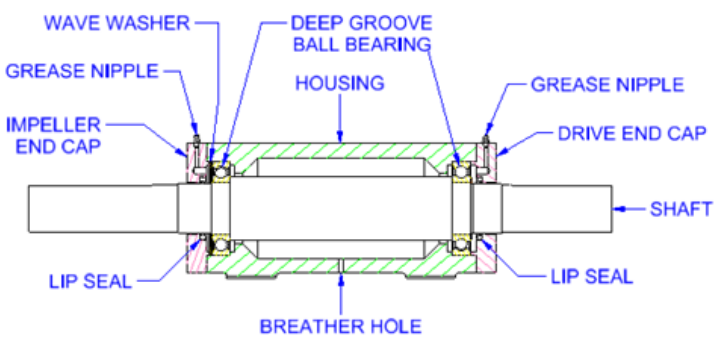


'V' SERIES BEARING UNIT





'M' SERIES BEARING UNIT



Depending on the fan application, bearing units can be fitted with either two deep groove ball bearings or a deep groove ball bearing and a roller bearing. When replacing, fit like for like, if unsure of which bearing unit/ bearings the fan has then contact our technical department quoting the serial number and fan type.

For Oil lubricated bearing units see section 5.4.3

5.4.1 Grease Selection

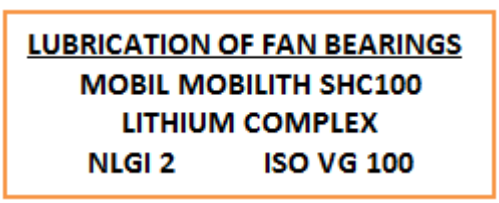
We typically use one of four greases for our fans depending on the application and factory. On customers request different greases can be used.

For high speed and/or light bearing load applications we use MOBILITH SHC100 (UK/USA) or MOBILTEMP SHC 100 (China) combining a synthetic base with high quality thickener.

For low/mid speed and medium to heavy bearing load applications we use GULF CROWN LC2 (UK/USA) or CASTROL SPHEEROL EPLX 200-2 (China) which are based on a mineral oil with lithium complex thickening.

Mixing of incompatible greases will cause a loss of bearing lubrication properties and premature bearing failure.

You must check the Lubrication plate on your fan to be sure of which type of grease to use The lubrication plate will be fitted on or close to the bearing unit. Examples of Lubrication plates are below:



Some equivalent greases are as follows:

	GULF Crown LC2 Equivalents		MOBIL Mobilith SHC100 Equivalents		MOBIL MobilTemp SHC 100 Equivalents	
	Type	**ISO VG**	**Type**	**ISO VG**	**Type**	**ISO VG**
Castrol	Spheerol EPLX 200-2	200	Longtime PD2	95		
FAG			Arcanol TEMP 110	68		
Gulf	Crown LC2	200				
Kluber			Kluberplex BEM41-132	120		
Mobil	Mobilgrease XHP 222	220	Mobilith SHC100	100	MobilTemp SHC 100	100
Shell	Gadus S3 V220C	220	Alvania RL	98		
SKF	LGEP2	200	LGMT2	110		
Total	Multis EP2	200				

Warning:

Do not mix different types of grease. Mixing of incompatible greases will cause a loss of bearing lubrication properties and premature bearing failure.

Only Spheerol EPLX 200-2 and GULF Crown LC2 are compatible. No other Halifax Fan standard grease combinations should be mixed

5.4.2 Manual Lubrication

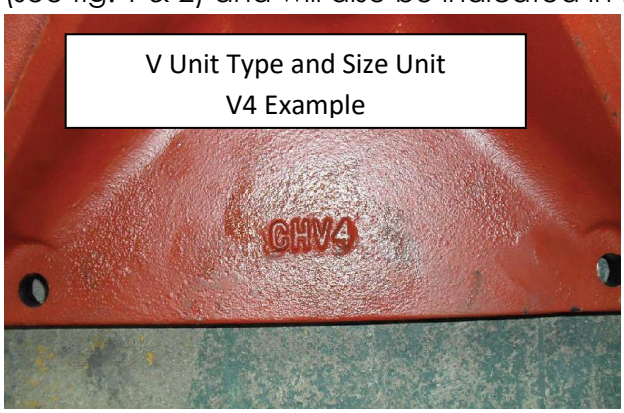
- Wipe clean both the grease nipples on the bearing unit
- Use only the correct grease. Ensure the grease gun has been thoroughly cleaned out if it previously contained an unsuitable grease.
- Inject the specified amount of grease into the bearings.

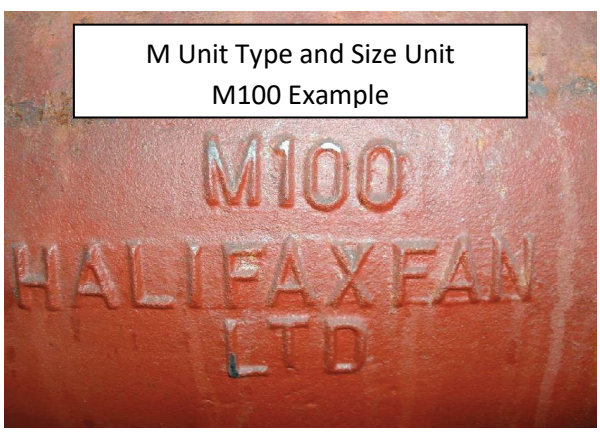
It is important not to over grease the bearings since this may increase the running temperature and shorten the bearing life.

Note:

Always follow the safety precautions specified in the grease manufacturer's material safety data sheet.

Lubrication intervals and grease quantities are given in the lubrication table on the next page, bearing unit type can typically be found enbossed into the bearing unit (see fig. 1 & 2) and will also be indicated in the title box on the GA Drawing.





If you require clarification on which bearings are fitted please contact our technical department quoting your serial number and fan type.

Standard Bearing Unit Lubrication Details

1 Shot = approx. 1.2 grams

Bearing Unit Reference	Bearing References	Bearing Dia (mm)	No. of Shots	Frequency (weeks) #				
				1000 rpm	1500 rpm	1800 rpm	3000 rpm	3600 rpm
V1	6304 C3 N304 ECP	20	2	238	156	129	75	61
V2	6206 C3 N206 ECP	30	2	190	123	101	57	46
V3	6307 C3 N307 ECP	35	4	173	112	91	50	40
V4	6208 C3 N208 ECP	40	3	160	102	83	45	35
V5	6309 C3 N309 ECP	45	5	148	94	76	40	31
V6	6211 C3 N211 ECP	55	5	130	81	64	31	23
L4	6208 C3 N208 ECP	40	3	160	102	83	45	35
L5	6309 C3 N309 ECP	45	5	148	94	76	40	31
LL5	6309 C3 N309 ECP	45	5	148	94	76	40	31
M6	6212 C3 N212 ECP	60	6	122	75	59	28	20
M7	6213 C3 N213 ECP	65	7	115	70	55	24	17
M8	6216 C3 N216 ECP	80	9	97	56	42	15	8
M9	6316 C3 N316 ECP	80	13	97	56	42	15	8
M11/M95	6220 C3 N220 ECP	100	15	78	41	29	5	1
M12/M100	6321 C3 N321 ECP	105	22	73	38	26	-	-
M12/M100 Hi Speed*	6221 C3 (x2)	105	22	-	-	-	2	1

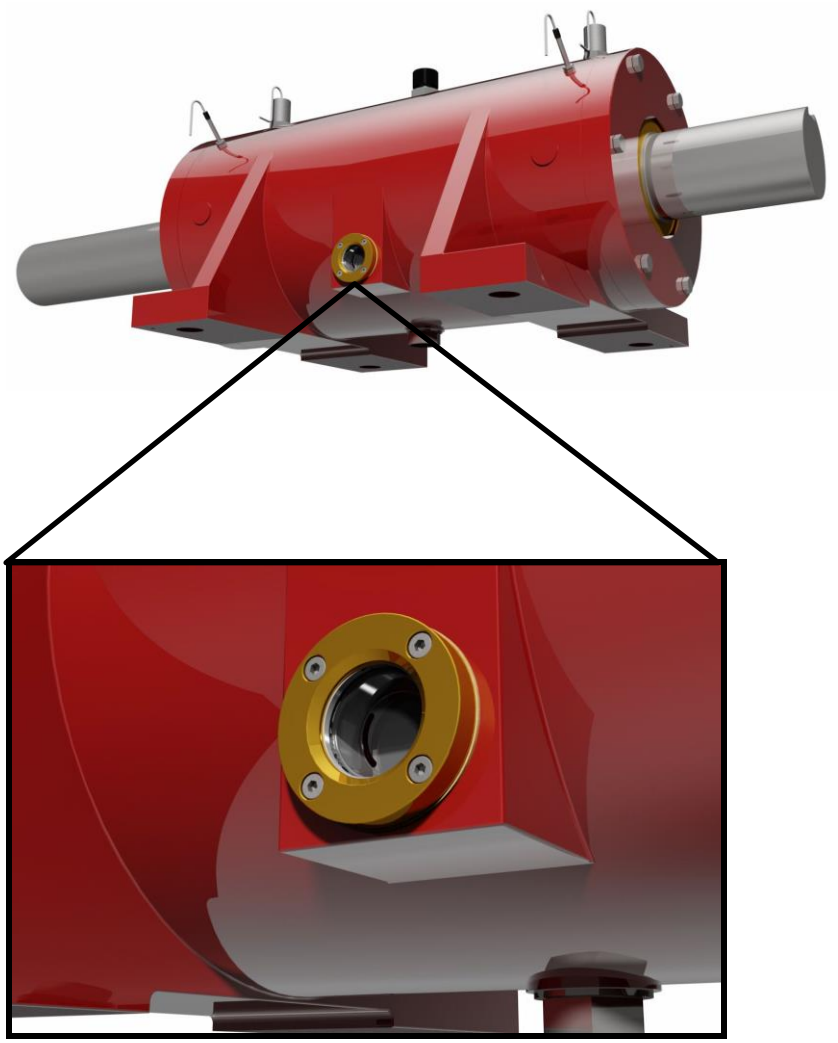
* *DIRECT IN LINE DRIVE*

\# For temperatures exceeding 65°C the frequency should be halved.
For vertical units the frequency should be halved.

All figures are for guidance only. For more specific information and for details on specials, please contact our technical dept.

5.4.3 Oil lubrication

For oil lubricated bearing units, a sight glass will be fitted as below;



The oil level should be checked with the fan stationary and should be up to the centre of the sight glass.

The oil should be replaced every 12 months (sooner if it becomes distinctly discoloured ie black) with the recommended type as per the lubrication plate fitted on or close to the bearing unit.

An example of a lubrication plate:

6. Hazardous Area (ATEX Certified 2014/34/EU)

Under no circumstances should an ATEX certified fan be modified by anyone other than a Halifax Fan approved engineer/ technician working in accordance with Halifax Fan approval/ instruction. Unauthorized dismantling and assembly may introduce the risk of explosion due to incorrect assembly and could invalidate the ATEX certificate.

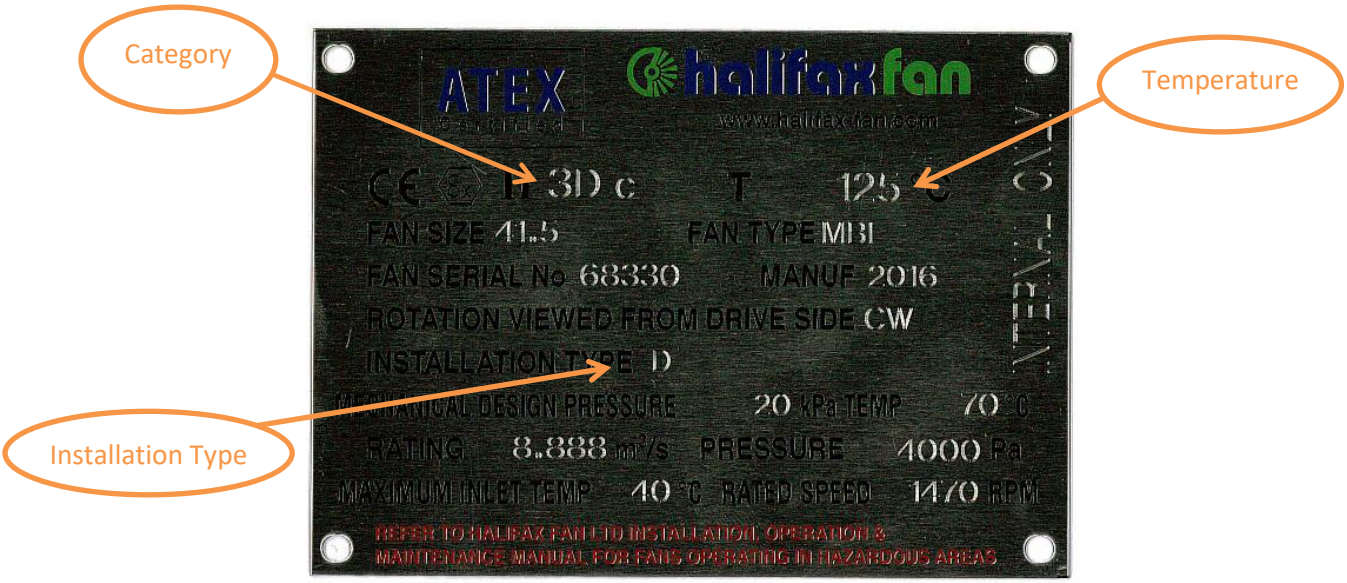
In order to ensure sound operation of the fan and maintain the explosion prevention and protection features provided it is essential that the fan is installed, commissioned and maintained correctly**.** It is a requirement that instructions below are adhered to:

- Check nameplate (see diagram/ table in section 6.1) displays correct ATEX hazardous area certification marking including Equipment Group, Category, Gas hazard with Temp Class and/or Dust hazard with maximum surface temperature.
- It is essential to check that the fan is certified and suitable for the area for which it is being installed into.
- Check the installation type (section 6.1.3).
- Check that the impeller and drive assembly rotate freely.
- Ensure direction of rotation is as per the name-plate.
- Ensure fan "RATED SPEED" is within 5% of indicated value

Ensure running current is within Full Load Current indicated on Motor nameplate.

- Ensure vibration levels do not exceed the values given in section 4.7. Record start up vibration values, fan bearing (if applicable) and motor bearing temperatures in the "Start up" section of the Fan Commissioning Record - Appendix C.
- Fan "RATING" is given on nameplate, to maintain the maximum surface temperature rating, it is important to ensure that the installed operational "Volume" and "Pressure" being provided by the fan is within 5% of indicated values.
- Ensure "Maximum Inlet Temperature" indicated on nameplate is not exceeded.
- After 4 hours running repeat vibration and bearing temp check as previous task and record in relevant section of Appendix C. Also record fan casing surface temperature. NOTE it is important that NONE of the recorded temperatures exceed the ATEX Gas and Dust surface temperature limits indicated on the fan ATEX nameplate.

6.1 Understanding your ATEX nameplate



6.1.1 ATEX Categories

Check the table below and nameplate on the fan to ensure your fan is suitable for the area it's going into. Equipment for potentially explosive atmospheres is divided into two groups, group I equipment for mines and group II equipment for places with potentially explosive atmospheres other than mines. Group II is applicable to our fans and is split into three categories, category 1, category 2 & category 3.

Zones / Categories for Dust & Gas

Area Classification Directive 1999/92/EC	ATEX Classification Directive 2014/34/EC
Zone 0	Category 1 G (gas)
Zone 1	Category 2 G
Zone 2	Category 3 G
Zone 20	Category 1 D (dust)
Zone 21	Category 2 D
Zone 22	Category 3 D

Category 1 Equipment is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dust mixtures are present continuously, for long periods or frequently. Equipment of this category shall ensure requisite level of protection even in the event of a rare malfunction.

Category 2 Equipment is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by

7. Health & Safety

Guarding

Fans inherently contain rotating parts and as such must have guarding to cover against all potential hazards. All guarding should be periodically checked.

CE Marking

All our fans are covered by the CE marking **for Incorporation** i.e. 'partly completed machines', which declares that the product complies with the essential requirements of the relevant European health, safety and environmental protection legislation. **Full CE compliance responsibility lies at the point of final installation and commissioning.**

Engineers

The instructions given in this manual are intended to be followed by competent electrical and mechanical engineers only. If you are unfamiliar with the operation of fans please seek expert advice, do not guess.

COSHH

COSHH data sheets are available on request for the grease used in our bearing units and motors.

Isolation

It is essential that the correct isolation is fitted before attempting any maintenance on our fans.

8. Storage & Prolonged Standstill

Bearing- Static Indentation

The fan and motor should be stored in an area free from any source of vibration or shock loading. The tension in the belt drive should be released and the belts removed since these are the conditions that would cause premature bearing failure due to static indentation. Both the fan and motor shaft should be rotated by hand every week prior to commissioning. (See appendix B Fan Rotation Record).

Lubrication

The fan bearings (if applicable) are lubricated in the factory. For the motor bearings refer to manufacturer's documentation.

Check the bearings and grease/ oil in both fan and motor are in satisfactory condition and showing no signs of deterioration.

Condensation

Fans and motors should be stored in a warmed, ventilated store to minimise the risk of condensation.

Fans and motors provided with drain holes should have the holes kept open and clean. In storage the motors should be stood such that the drain holes are at the lowest point. This will allow any condensation which does form to escape

For Fans and motors without drain holes no action is necessary provided that the environment is kept warm and ventilated, although a periodic insulation test on the motor is advisable (approximately three monthly) to ensure it is maintained above 1 megohm.

If motors are to be used or stored in cold and/or damp environments, we recommend the fitting of anti-condensation heaters, the heaters should be permanently energised if stored in these conditions.

Ensure the Heater circuit is isolated before inspection. Periodically, the insulation resistance to earth should be checked using a 500 volt insulation tester.

Remember the following:

- **IF IN A HAZARDOUS AREA USE AN "Ex" MEGGER.**
- **DO NOT USE A TEST VOLTAGE IN EXCESS OF 500 VOLTS.**
- **DO NOT APPLY TEST TO THERMISTORS (IF FITTED).**

(When checking for continuity of thermistors, voltage must not exceed 6v).

9. Trouble Shooting

Bearing over-temperature

- ☐ Are bearing temperatures within the limits in section 4.8.1 and 4.8.2
- ☐ Have the fan bearings been given sufficient time to 'bed in' (Refer to section 4.8.3)
- ☐ Excessive lubricant in the bearings (Refer to section 5.4). Clean and re-grease.
- ☐ Insufficient lubricant in the bearings (Refer to section 5.4.2)
- ☐ Incorrect bearing lubricant used (Refer to section 5.4.1)
- ☐ Incorrect belt-drive/coupling set-up (tension/alignment). Adjust drive-train set-up. (Refer to sections 4.4 and 4.5).
- ☐ Bearing unit subjected to excessive vibration (see section below).
- ☐ For fan units subjected to high temperature applications. Ensure all bearing cooling protection is in place and operational.
- ☐ Fan unit working over capacity/speed.

Fan performance

- ☐ Identify volume, pressure and density design specification.
- ☐ Incorrect direction of rotation. Check name-plate and correct.
- ☐ Low volume. Drive speed too low. See motor section below. Check drive-train.
- ☐ Low volume. Air leakage in system. Check for gaps/leakage in ducting and joints. Repair and re-check.
- ☐ Low volume. System resistance is higher than specification. Check for restrictions and all dampers are open.
- ☐ High volume. Drive speed too high. See motor section below.
- ☐ High volume. System resistance is lower than specification. Check for system integrity.
- ☐ Incorrect clearances between impeller and casing.
- ☐ Establish current fan operational duty point and consult Halifax Fan technical dept.

Drive motor over-loading

- ☐ Check motor current is within name-plate FLC.
- ☐ Motor tripping on start up. Ensure starter and/or overloads are correctly sized for motor and run up time. Due to high inertias, fans have extended run up times and require starting equipment capable of withstanding increased currents during starting whilst still protecting the motor when running.
- ☐ Ensure fan is not operating at or near free air condition i.e. No or very low system resistance.
- ☐ For high temperature fans not fitted with "cold start" motors, ensure air flow is restricted during starting/warming of fan and system.
- ☐ Incorrect motor wiring e.g. in Y or Δ for correct voltage. Rewire per supplier instructions.
- ☐ Motor supply phase currents not equal. Possible motor fault. Contact supplier.
- ☐ Incorrect direction of rotation. Check name-plate and correct.
- ☐ Shaft/impeller not free to rotate. Check for obstruction and remove.
- ☐ Incorrect fan operating duty conditions. Identify volume, pressure and density design specification.

Excessive fan vibration

- ☐ Are vibration readings within the limits in section 4.7
- ☐ Heavy dirt or damage on the impeller creating an imbalance. Clean/repair and re-balance impeller.
- ☐ Mechanical interference on belts/coupling/impeller. Remove interference and re-check.
- ☐ Check for impeller imbalance. Dis-engage drive-train, manually rotate the impeller. Impeller stops in same position if out of balance. Re-check for damage and re-balance.
- ☐ Loose bolts/ foundations/dampers. Tighten or replace and re-check.
- ☐ Worn coupling. Replace with new unit.
- ☐ Incorrect belt-drive/coupling set-up (tension/alignment). Adjust drive-train set-up.
- ☐ Fan operating over capacity/speed. Close dampers/reduce speed and re-check.
- ☐ Record vibration spectrum per bearing. Refer to guides in Appendices D and E.
- ☐ Worn drive bearings. Replace and grease unit.

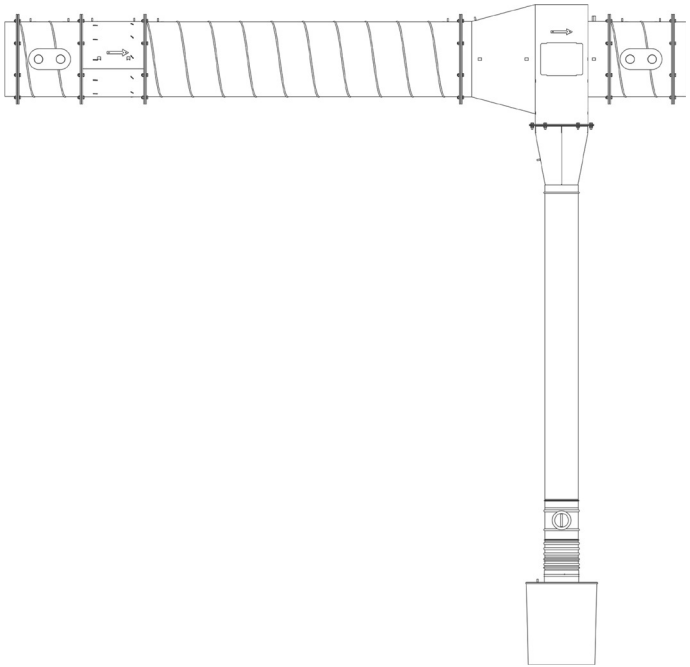
If further assistance is required, contact the Halifax Fan technical department.

IMPORTANT : Before carrying out any physical fan checks, electrical or mechanical, it is important to ensure that the fan and its electrical supply are correctly isolated.

SECTION NO. 4.

SPARK ARRESTOR.

KEMPER



SparkTrap

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1 General information

1.1 Introduction

This manual is an essential aid for the proper and safe operation of the KEMPER SparkTRAP pre-separator, hereinafter referred to as pre-separator.

The operating instructions contain important information for the safe, proper and efficient operation of the pre-separator. Compliance with this user manual contributes to avoiding risks, reduce repair costs and downtime and increase the reliability and lifetime of the pre-separator. The operating manual must always be available and should be read and applied by any person who is authorized to work on or with the pre-separator.

This includes:

- operation and troubleshooting during operation,
- maintenance (care, maintenance, repair),
- transport, and
- assembly.

1.2 References to copyright and industrial property rights

This operating manual must be kept confidential. It should be only accessible to authorized persons. It can only be disclosed to third parties with a written consent of the KEMPER GmbH.

All documents are protected under copyright law. The reproduction and distribution of documents, including excerpts, as well as exploitation and communication of its contents is not permitted, unless expressly permitted in writing.

Violations are punishable and will result in liability for damages. All rights to exercise industrial property rights are reserved by the KEMPER GmbH.

1.3 Information for the operator

The operating manual is an integral part of the pre-separator. The operator shall ensure that the operating personnel take note of this manual.

The operating manual must be added by the operator to the operating instructions due to national regulations for accident prevention and environmental protection, including information on regulatory and reporting requirements to meet specific operating requirements, e.g., pertaining to work organization, work processes and employed personnel. Apart from the instruction manual and the legally binding accident prevention provisions applicable in the country and place of use, the recognized technical regulations for safe and proper work must also be observed.

The operator may not make any additions and modification on the pre-separator that might affect safety, without the authorization of the KEMPER GmbH! This applies particularly to the installation and adjustment of safety devices and safety valves as well as for the welding on load-bearing components. The spare parts to be used, must meet the technical requirements specified by the KEMPER GmbH. This is always ensured with original spare parts!

Only trained or instructed personnel may operate, maintain, repair and transport pre-separator. Clearly define the personnel's responsibilities that pertain to the operation, maintenance, repair and transport.

2 Safety

2.1 General Information

The pre-separator is designed and built according to state-of-the-art technology and recognized safety rules and regulations. During operation of the pre-separator, hazards for the operator or damages to the pre-separator can occur if:

- operated by untrained or uninformed personnel,
- not used as intended and/or
- is maintained improperly.

2.2 Information on signs and symbols

DANGER

This is a warning of direct imminent danger that would lead to severe injury or death, if the specific instructions are not followed precisely.

WARNING

Indicates a potentially hazardous situation that could lead to severe personal injury or death, if the specific instructions are not followed precisely.

CAUTION

This is a warning of a potentially hazardous situation, with the result of minor or moderate injury or property damage, if the specific instructions are not followed precisely.

NOTE

This is a reference to useful information for safe and proper use.

- The working and/or operating steps are indicated with a bullet.
  The steps must be performed in order from top to bottom.

– The dash indicates an itemization.

2.3 Labels and signs to be posted by the operator

The operator is obliged, where appropriate, to post additional labels and signs on the pre-separator and the surrounding area.

Such labels and signs can, for example, pertain to the requirement of wearing personal protective equipment.

2.4 Safety instructions for the operating personnel

The pre-separator shall be used in technically perfect condition only and acc. to the intended use, in awareness of the safety aspects and hazards, under strict adherence to the operating instructions! All errors and especially those that can impair safety must be rectified immediately!

Each person who is charged of the commissioning, operation or maintenance, must have fully read and understood this operating manual - in particular Section 2 Sicherheity. It would be too late to read it during operation. This only applies to personnel who occasionally work on the pre-separator.

The operating manual must be always at hand and close to the pre-separator.

No liability is assumed for any damages or injuries caused by the failure to observe these operating instructions.

The relevant accident prevention regulations and other generally recognized safety and health rules and regulations must be observed.

The responsibilities for different activities that pertain to servicing and maintenance must be clearly specified and followed. This is the only way that improper handling -- especially in dangerous situations -- can be avoided.

The operator ensures that the operating and maintenance personnel wear personal protective equipment. These include in particular safety shoes, safety glasses and gloves.

Tie back long hair, no loose clothing or jewelry! There is always the danger of getting caught somewhere or to be pulled in or dragged along by moving parts!

Should safety-related changes on the pre-separator occur, the suction must be immediately stopped and secured and report the process and the incidence has to be reported to the responsible place/authority!

Work on the pre-separator must be performed only by trained and reliable personnel. Observe the minimum age!

The personnel to be trained, taught, instructed or as part of a general education, may only operate on the pre-separator under the supervision of an experienced person!

2.5 Safety instructions for maintenance and troubleshooting at the pre-separator

Setup, maintenance, repair work and troubleshooting must be performed only when the system is switched off.

For maintenance and repair work, always tighten the loose screws! If required, tighten the screws provided with a torque wrench.

In particular, clean dirt and care products of connections and fittings before performing maintenance/repair/care work.

3 Product description

The pre-separator is intended for the separation and elimination of Sparks from the outlet air flow.

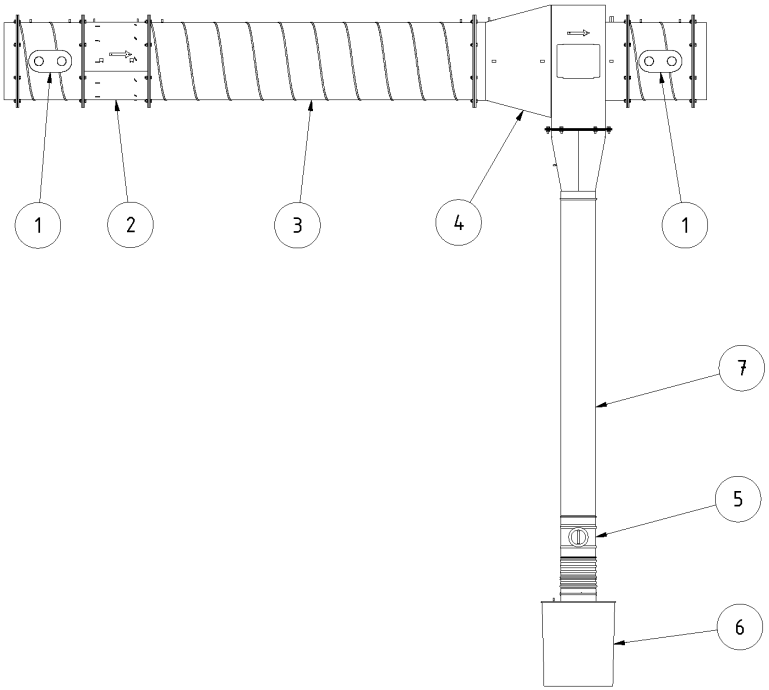


Figure 1, Item description

Item	Description
1	Inspection cover
2	Swirl nozzle
3	Separation distance
4	Annular gap Spark trap
5	Shut-off valve
6	Dust collector
7	Down pipe

3.1 Intended use

The pre-separator is intended for the separation and elimination of Sparks from the outlet air flow. The pre-separator is limited to its technical design. The output depends on the type of collection equipment and the degree of pollution of the exhaust air. For operation, the following conditions must be observed:

Application - in the metal industry for the deposition of Sparks and dust, which are entrained during the suction in welding areas or during thermal cutting. The pre-separator may not be used for combustible dust and other materials that can form an explosive mixture with air.

Disposal - separated particles may contain residual traces of harmful substances, they must be disposed of in accordance with the environmental regulations. These country-specific regulations must be observed accordingly.

Operating condition - A pipeline system connected on the suction side with the collection device(s) and the downstream piping system, which leads to the suction and filter system.

For dimensions and further details on the pre-separator, which must be observed, see the Technical Specifications.

NOTE

Observe the instructions in Section 9.1 Technische Datens.

The instructions must be strictly observed.

Instructions regarding the intended use also include:

- safety,
- operation and control,
- repair and maintenance

that are described in this manual.

Any other use is not intended for this use. The operator of the pre-separator is solely responsible for damages that result from an improper use. This also applies to unauthorized modifications to the pre-separator.

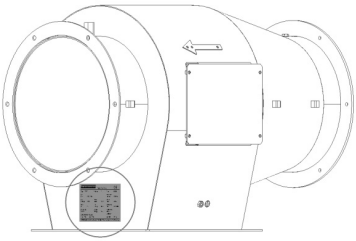
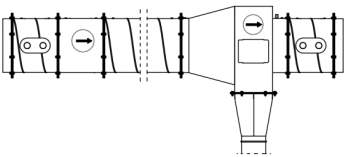
3.2 Reasonably foreseeable misuse

The operation of the pre-separator cannot be used in industrial areas where requirements for explosion protection must be met. Furthermore, the operation is prohibited for:

- Procedures that are not listed under the intended use and in which the sucked in air is:
  - mixed with liquids and the resulting contamination of the air flow with aerosol and oily vapors;
  - mixed with flammable, combustible dusts and/or with substances which may form explosive mixtures or atmospheres;
  - mixed with other aggressive, abrasive dust that damage the pre-separator;
  - mixed with organic, toxic substances/proportions of substances that are released during separation of the material.
- **Waste materials** such as separated particles may contain harmful substances. They must not be disposed of in the domestic waste landfill; the environmentally friendly disposal is required.

  If the pre-separator is used as intended, no reasonably foreseeable misuse that could lead to dangerous situations involving personal injury should be possible.

3.3 Labels and signs on the pre-separator

Sign	Meaning[*1]	Location for the sign
Type plate	with the information: – KEMPER GmbH Von-Siemens-Str. 20 DE-48691 Vreden – Type SparkTRAP DN250, DN355, DN450, DN560 – Year of manufacture: 1/2013 – Machine No.: 192341 – Weight: 65 kg, 85 kg, 115 kg,155 kg	
Flow arrows	Flow direction of the suction air	
	Protective grounding terminal	Next to the grounding points

*1 Example of information on type plate.

3.4 Residual risk

Even if all safety regulations are observed, the residual risk described below, still remains during the operation of the pre-separator.

All persons working on and with the pre-separator must be aware of this residual risk and follow the instructions that will prevent these residual risks that lead to accidents or damage.

During set-up and preparation work, it may be necessary to dismantle on-site equipment. This creates different residual risks and potential hazards that the operator must become aware of:

WARNING

Serious injury to the respiratory tract and organs are possible
- wear respiratory protection, e.g., KEMPER autoflow XP or a Class FFP2 EN 149 dust filter mask.

Skin contact with cutting smoke, etc. can lead to irritation for people with sensitive skin - wear protective clothing.

Before starting the cutting work, make sure that the pre-separator is connected to the operator's existing exhaust and filter system and is up and running!

When using the pre-separator, there is also no fire protection of the downstream exhaust and filter system that is 100% guaranteed!

If there are leaks on the pre-separator and when replacing the dust collection, dust can get into the environment, repair leaks immediately and clean the contaminated area - wear respiratory protective equipment and protective clothing.

Pockets of embers in the dust collector can possibly lead to a smoldering fire - cool dust collector and change as soon as possible, wear protective gloves!

4 Transport and storage

4.1 Transport

DANGER

Life-threatening crushing during transport of the components of the pre-separator!

By improper lifting and transporting the components of the pre-separator may tip and fall down!

- Do not stand or walk under suspended loads!
- The components of the pre-separator must be secured against falling!

For the transport of the individual components of the pre-separator a pallet truck or forklift is to be used.

4.2 Storage

All components of the pre-separator should be stored in their original packaging at an ambient temperature of -20 ° C to +55 ° C in a dry and clean place. The no other objects should be placed on top of the individual components of the pre-separator.

5 Installation

DANGER

Life-threatening injuries during the assembly of the pre-separator by falling parts!

By improper lifting and transporting the components of the pre-separator may tip and fall down

- **Do not stand or walk under improperly assembled components of the pre-separator!**
- When lifting is required during the assembly, components of the pre-separator must be secured from falling!
- The assembly must only be done by two people.
- Use appropriate and approved ascending aids and ensure a secure standing.

NOTE

For an independent assembly, the operator of the pre-separator can instruct only persons who are familiar with this task.

5.1 Mechanical assembly

- Assemble the individual components of the pre-separator as shown in Figure 2 and fasten it with the screws provided, the minimum distances (min 600mm) to parts of buildings in the area of passenger traffic must be observed.
- Ensure the correct direction of flow for the swirl nozzle (item 6) and the annular gap Spark trap (item 8), they are marked with appropriate flow arrows, which must be observed!
- The formed components (item 12, 13, 14) must be attached with each other at each connection point by three evenly circumferentially arranged drill screws.
- The cable tray (item 21) is only necessary in conjunction with an automatic Spark detection (SparkTRAP detect) and must be only installed as a cable guide.
- Turn the plug with gasket (1/4 ") (item 20) into the sleeve socket of the annular gap Spark trap, item 8.

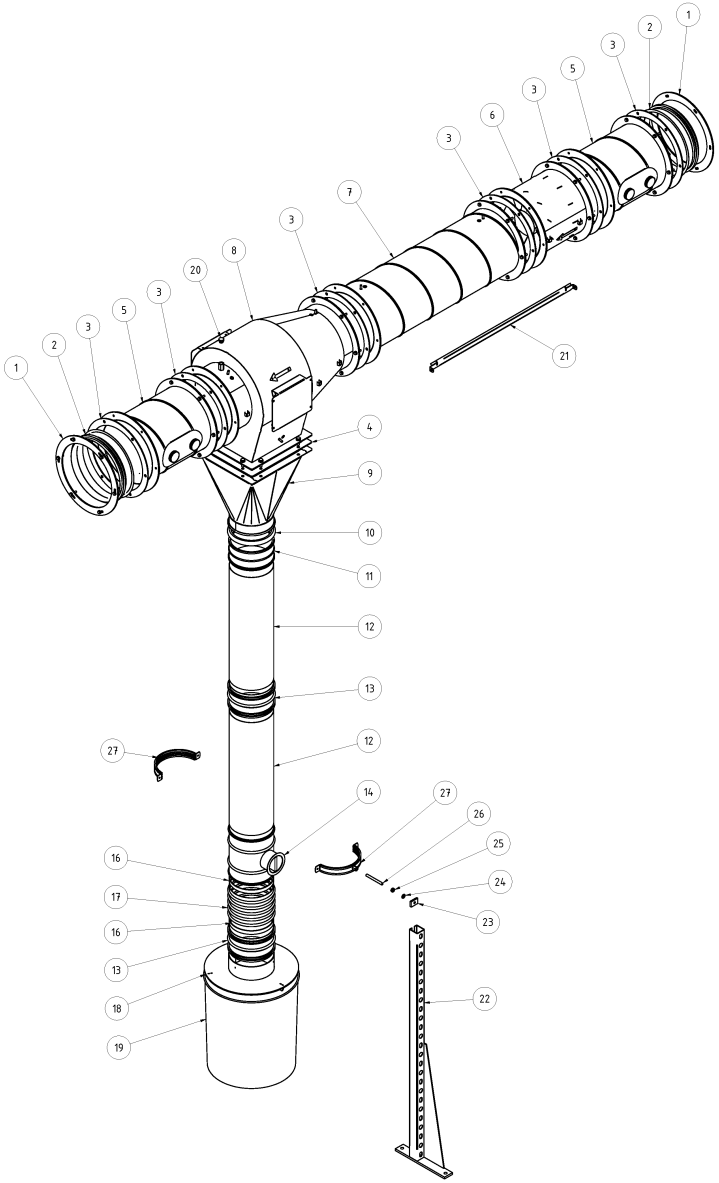


Figure 2, Mechanical Assembly (rear view)

Item	Description	Quantity
1	Flange ring	2
2	Connection ring	2
3	Rubber seal, round	6
4	Rubber seal, rectangular	1
5	Tailpipe	2
6	Swirl nozzle	1
7	Separation pipe	1
8	Annular gap Spark trap	1
9	Transition piece	1
10	Draw latch 160 mm	1
11	Transition piece for Draw latch DN 160	1
12	Down pipe DN 160	2
13	Nipple DN 160	1
14	Shut-off valve DN 160	1
16	Hose clamp 160 mm	2
17	Connecting hose DN 160	1
18	Lid with opening DN 160	1
19	Dust collector 30 liter	1
20	¼ " plug with seal	1
21	Cable tray	1
22	Console l = 1000 mm	1
23	Sliding piece M8	1
24	Washer 8.4 x 25 mm	1
25	Nut M8	1
26	Threaded rod M8 x 300 mm	1
27	Pipe bearing halves DN 160	1

- Depending on local conditions, the supports must be provided on areas of the pre-separator that are marked with "**A**" or on wall mounts that serve as a supporting structure, which are available as accessories (see Section 9.4 Accessoires).
  The supports or wall bracket must be mounted with suitable screws M10 on the local attachment points.
- Attach the console (item 22), behind the dust collector bucket (item19) in such a way that it can be centrally positioned under the downpipe (item 12). The downpipe (item 12) can be fastened with the pipe clamp (item 27) and the mounting parts (item 23, 24, 25, 26) onto the console (item 22).
- Install the shut-off valve Pos.14 with the cup facing forward.
- After installation of the pre-separator open the shut-off valve to allow the separated dust to fall into the collection container

5.2 Grounding against electrostatic charges

The grounding of the pre-separator must only be performed by a qualified electrician or by trained personnel under the direction and supervision of a qualified electrician in accordance with electrical regulations!

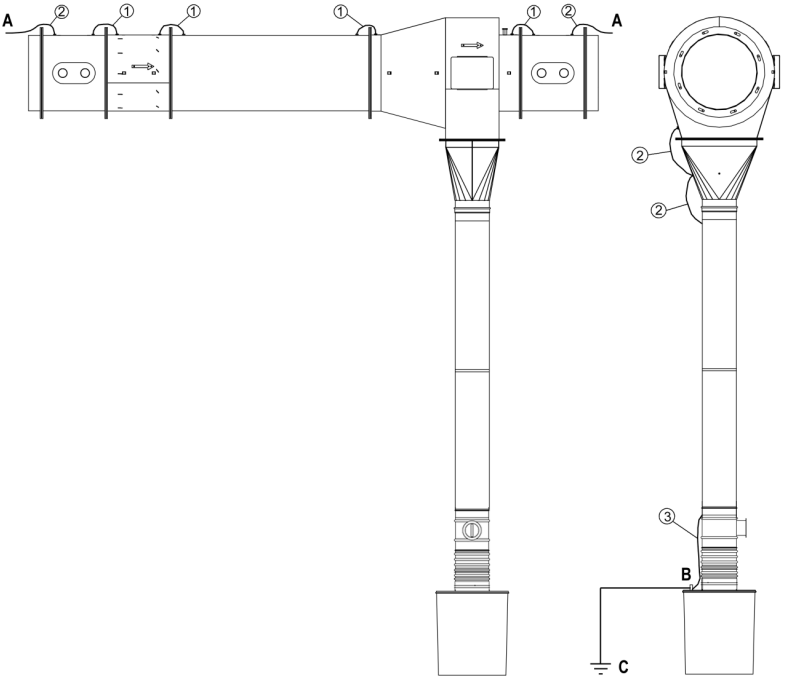


Figure 3, Grounding against Electrostatic Charges

Item	Description	Quantity
1	Grounding cable l = 200mm	4
2	Grounding cable l = 400mm	4
3	Grounding cable l = 600mm	1

- **A** = Cable end must be fastened to the connecting pipe with drill screws.
- **B** = Central grounding point of the pre-separator.
- **C** = Local grounding point (e.g., equipotential bonding rail) where the pre-separator must be connected.

The grounding cable on the downpipe (item 12) (see Figure2) is fastened with drill screws. After assembly, the grounding of the pre-separator must be inspected with a continuity tester.

6 Use

Any person who deals with the use, maintenance and repair of the pre-separator must have read and understood these operating instructions thoroughly.

6.1 Qualification of the operating personnel

For an independent use, the operator of the pre-separator can instruct only persons who are familiar with this task.

Being familiar with this task includes that the persons have been trained according to the task and understand the operating manual and the operating instructions in question.

The pre-separator can only be used by trained personnel. Only in this way can you ensure all personnel work in a safety conscious and risk aware manner.

7 Maintenance

The instructions described in this chapter are meant for reference purposes only. Depending on the operating conditions, for further instructions may be required to keep the pre-cleaner in an optimal condition. The time intervals indicated refer to a **single-shift** operation.

The maintenance and repair work described in this chapter, may only be performed by specially trained maintenance personnel of the operator.

The spare parts to be used, must meet the technical requirements specified by the KEMPER GmbH.

This is always ensured with original spare parts.

Ensure a safe and environmentally sound disposal of materials and replacement parts!

- Observe the safety instructions on the following pages!

7.1 Care

The care of the pre-separator is essentially limited to the replacing of the dust collection bucket and the cleaning of all surfaces from dust and debris inside the pre-separator.

WARNING

Skin contact with cutting smoke, etc. can lead to irritation for people with sensitive skin!

Serious injuries to the respiratory organs and ducts can occur!

To avoid contact and inhalation of dust, use protective clothing, gloves and respiratory protection equipment, for example, KEMPER autoflowXP or a class FFP2 EN 149 dust filter mask.

The release of hazardous dust must be avoided during cleaning, so no injuries can be caused to persons who perform such task.

Prior to cleaning, make sure that the pre-separator is connected to the operator's existing exhaust and filter system and is up and running!

Note

Do not clean the pre-separator with compressed air!

As a result, dust and/or dirt particles can be released into the ambient air.

The level in the dust collection bucket must be checked at regular intervals and the dust collection bucket must be replaced if necessary. Depending on the type and density of the collected dust, it may be necessary that the dust collecting bucket must be removed by two people, as the weight can exceed 20 kg. The replacing intervals of the dust collection bucket will depend on the type and quantity of the accumulated dust. Therefore, the operator must manually check the level on a regular basis be to avoid the over-filling of the dust collection bucket. The dust collector must be always replaced in time to avoid contamination of the environment!

When changing the dust collection bucket, the downstream exhaust and filter system can remain switched on.

Proceed as follows (see also Figure 2):

- Close the shut-off valve Pos. 14.
- Open the tension ring on the dust collector (item 15) and remove the cover (item 18) from the dust collection bucket.
- In reverse order, replace the dust collection bucket filled (item 15) with a new one.
- Open the shut-off valve.
- Close the filled dust collector with the provided cover and plug and label it with the information of the contained dust.

Appropriate care helps to permanently keep the pre-separator in a safe operational condition.

- Clean the pre-separator thoroughly once a month.
- The outer surfaces of the pre-separator can be cleaned with a suitable industrial vacuum cleaner for dust class H.
- To clean the inside surfaces of the pre-separator proceed as follows:
  - Turn on the exhaust and filter system, so that a negative pressure builds up in the pre-cleaner, which reduces the release of dust.
  - Open the two inspection openings item 1 (seeFigure 1).
  - With a brush remove deposits have settled inside the pre-separator.
  - Close the inspection openings.

7.2 Maintenance

A safe function of the pre-separator is positively influenced by a regular inspection and maintenance, which should be done at least once a year.

WARNING

Skin contact with cutting smoke, etc. can lead to irritation for people with sensitive skin!

Repair and maintenance work on the pre-separator must be performed only by trained and authorized personnel in accordance with the applicable safety and accident prevention regulations!

Serious injuries to the respiratory organs and ducts can occur!

To avoid contact and inhalation of dust, use protective clothing, gloves and respiratory protection equipment!

The release of hazardous dust must be avoided during repair and maintenance work, so no injuries can be caused to persons who perform such task.

Prior to repair and maintenance work:

- Use only the proper tools for all work.
- Before the disassembly, label the different components of the pre-separator in their sequence.
- Only original spare parts must be used.
- Keep the work area of the pre-separator clean, so that no dust is released into the environment.
- In addition to the information provided under Section 7.1, the separation tube (item 3) and the downpipe item 7 (see Figure 1) must be disassembled and debris inside must be removed.
- Inspect the pre-separator for damages.
- Inspect the pre-separator for leaks.
- Inspect the gate valve item 5 (see Figure1)) for proper operation.

8 Disposal

WARNING

Skin contact with cutting smoke, etc. can lead to irritation for people with sensitive skin!

Disassembly work on the pre-separator must be performed only by trained and authorized personnel in accordance with the applicable safety and accident prevention regulations!

Serious injuries to the respiratory organs and ducts can occur!

To avoid contact and inhalation of dust, use protective clothing, gloves and respiratory protection equipment!

The release of hazardous dust must be avoided during disassembly, so no injuries can be caused to persons who perform such task.

CAUTION

When working on or with the pre-separator, comply with all legal obligations for waste disposal and have a proper recycling/disposal!

8.1 Plastics

The plastics used must be sorted as far as possible. Plastics must be disposed in compliance with the legal requirements.

8.2 Metals

Separate different metals and dispose. Disposal must be carried by an authorized company.

8.3 Final decommissioning

Disassembly work must be done with great care, so that dust adhering to the pre-cleaner is not whirled up and no injuries can be caused to persons who perform such task. The work area should be separated/identified and whirled up dust must be immediately removed with a vacuum cleaner for dust class H!

Before starting disassembly, all dust remaining in the pre-separator must be removed. For this purpose, a suitable vacuum cleaner for dust class H should be used and personal protective equipment such as protective clothing, gloves, respiratory protection equipment etc. must be used to prevent exposure to hazardous dusts.

After the disassembly of the pre-separator, the work area must be cleaned.

Prior to a disassembly with a subsequent disposal the proper disposal of housing parts contaminated with cutting dusts must be coordinated and clarified with the regional waste disposal company.

9 Appendix

- Technical Specifications
- Pressure Loss Diagram
- Spare Parts List
- Accessories

9.1 Technical specifications

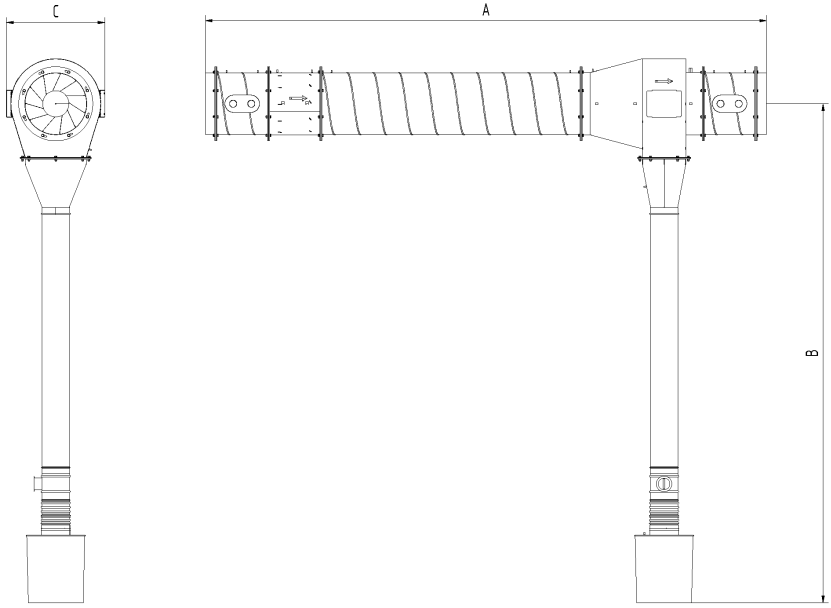
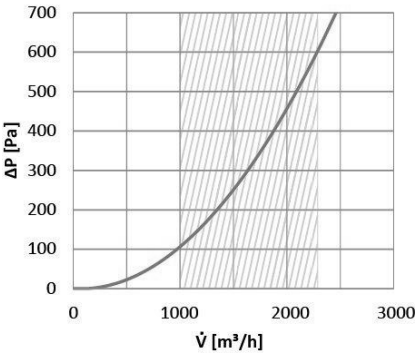


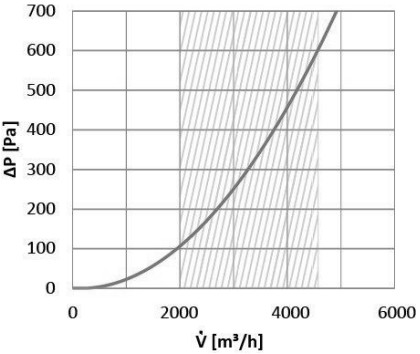
Figure 4, Technical Specification

Connection Ø [mm]	DN 250	DN 355	DN 450	DN 560
Recommended flow volume V [m^3/h]	2,500	5,000	8,000	12,500
Max. pressure loss Δp [Pa]	700	700	700	700
Length A [mm]	2,340	3,240	3,830	4,590
Height B [mm]	1.120...2.620	1.200...2.700	1.270...2.770	1.350...2.840
Depth C [mm]	412	570	710	854
Approx. weight [kg]	65	85	115	155
Item No.:	196 200 250	196 200 355	196 200 450	196 200 560

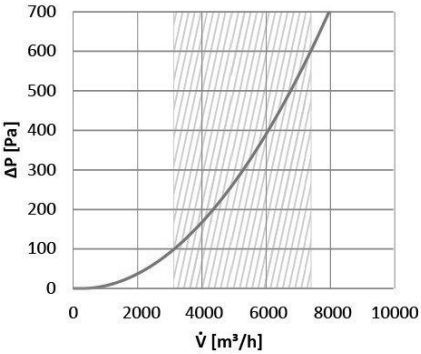
9.2 Pressure loss diagrams



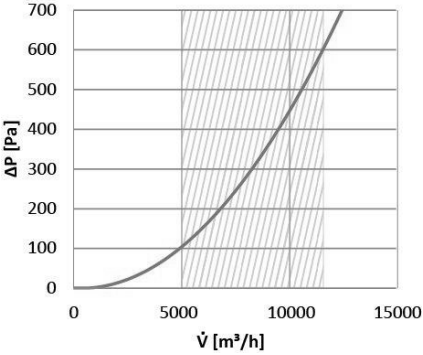
SparkTRAP DN 250



SparkTRAP DN 355



SparkTRAP DN 450



SparkTRAP DN 560

= recommended application area

SECTION NO. 5.

HEPA FILTER SET.

EMCEL Filters Limited
Blatchford Road, Horsham, West Sussex, RH13 5RA, UK
Tel: +44 (0)1403 253215 Fax: +44 (0)1403 217011
www.emcelfilters.co.uk

Operation and Maintenance Recommendations

EMCEL Batch Number: 52620.01
Customer: Duscovent Engineering Limited
Customer Order No.: 30868/3052/BT
Job Reference: Autovent, Stoke-on-Trent

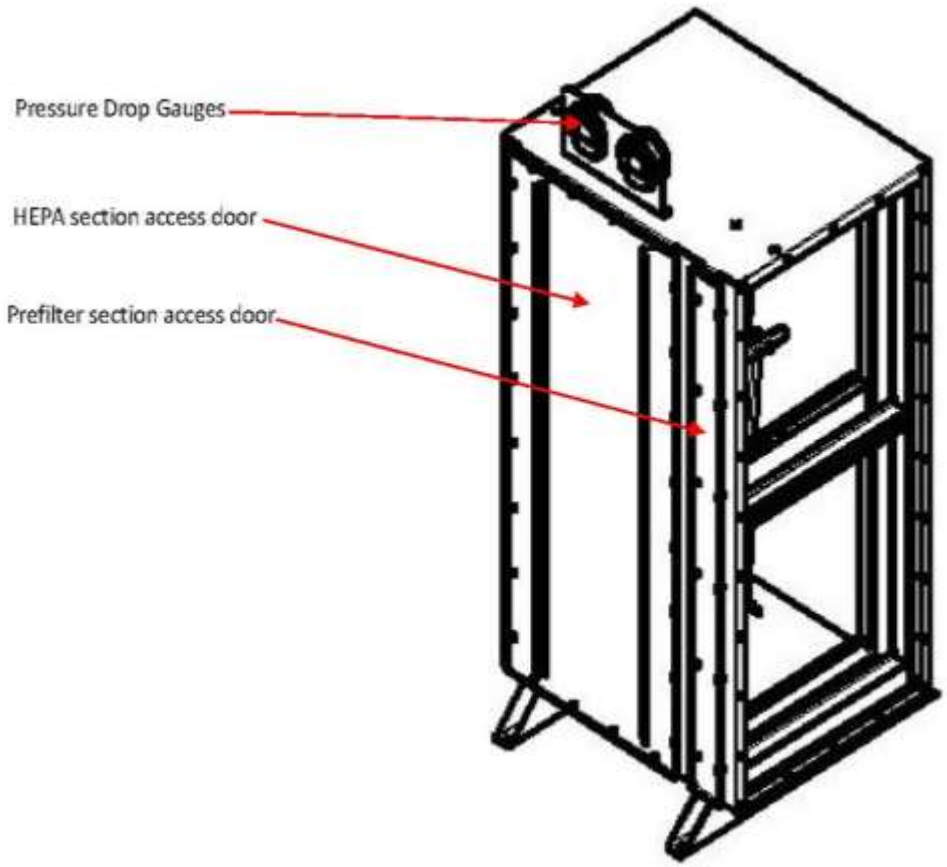
G4 & HEPA Filtration Unit
EMCEL Drawing Number: E2203-30 GR100
EMCEL Part Number: 031.3.591

Filter Unit

The filter unit has a rated air flowrate of 5,000m³/h. The unit casework is manufactured from mild steel, epoxy powder coated RAL7032 (Pebble Grey). The casework is supplied with 30mm wide, internal, return flanges fitted with M8 female threaded inserts for bolting to ductwork on the inlet and outlet sides.

The filter unit is made up of two filtration stages. (see below)

- Stage 1 – G4 pleated panel filters - 2 off
- Stage 2 - HEPA filters >99.95% efficient to EN14644 (volumetric test) - 2 off



EMCEL Filters Limited

Installation of Filters

The access doors are located on the left hand side of the unit as viewed from the air inlet end.

Prefilter Section

G4 panel filters Part number: EP4P625615047A01

Access to the pre-filters is via the right hand, narrower, removable panel located on the side of the unit. First, undo and remove all the nuts and washers and remove the access door and door seal. The G4 panel filters are installed by sliding them in from the side of the unit into their channels, one above the other. The door seal, access door, nuts and washers should then be replaced and the nuts tightened to ensure an airtight seal. In order to change out the filters this process is reversed.

Each G4 panel filter has a card frame with pleated filter medium.

Please ensure that the dirty filter panels are disposed of in accordance with local environmental requirements and by-laws. It is suggested that polythene bags are to be used when removing the filters for ease of disposal.

HEPA Filter Section

HEPA panels Part number: 031.2.603

Access to the HEPA filters is via the left hand, wider, removable panel located on the side of the unit. First, undo and remove all the nuts and washers and remove the access door and door seal. The HEPA filters are installed by sliding them into place, one above the other and then secured by means of bolted clamping bars, which tighten to compress the seal on the face of the HEPAs and form an airtight seal. The seals must not be compressed by more than 50% of their original thickness. The door seal, access door, nuts and washers should then be replaced and the nuts tightened to ensure an airtight seal. In order to change out the filters this process is reversed.

The filters are removed by releasing the bolted clamping bars and sliding the filters out of the housing.

The filters weigh approximately 25kg and may require 2 people when lifting in and out of the unit.

Please note that care must be taken when inserting the HEPA filters so as not to damage the seals against the unit.

The HEPA panel filters are better than 99.95% efficient against EN14644 (volumetric test). Each HEPA filter has a galvanised steel casing with a flat-faced, single piece neoprene seal, on the dirty air face.

Note: After a period of time, the seals may adhere to the mounting face. It is important to ensure that, after removal of the HEPAs, any residual material from old seals is removed and that the surface for the new seals is clean. When sealing the new HEPAs in the housing, care should be taken when compressing the seals - simultaneous equal pressure to clamps will eliminate twisting of the HEPA casings and uneven compression on the seals.

Please ensure that the dirty filter panels are disposed of in accordance with local environmental requirements and by-laws. It is suggested that polythene bags are to be used when removing the filters for ease of disposal.

Manometer Commissioning

Based upon the rated flow of the unit, 5,000m³/h, the estimated starting pressure drop of each of the stages of filtration are as follows:

	Clean	Dirty
Pre-filter stage:	50Pa approx.	175Pa approx.
HEPA filter stage:	200Pa approx.	450Pa approx.

Replacement is indicated when the resistance across the filter unit increases above set limits for the system and in any case when the resistance reaches the recommended final resistance for each filter section. It is suggested that a monitoring period is established as this will define a regular maintenance period.

Replacement Filters

Spare filters can be ordered from EMCEL Filters by quoting the Drawing Numbers or Part Numbers shown below.

Filter Unit	Drawing No. E2203-30 GR100	Part No. 031.3.591
2 No. **G4 Panel Filters**		Part No. EP4P625615047A01
2 No. **HEPA Panel Filters**	Drawing No. E2013-20 GR60	Part No. 031.2.603

Please note: The lead time for replacement filters from EMCEL Filters would be approximately 4 weeks for the G4 panel filters and approximately 6 weeks for the HEPA filters associated with this unit.

Door Seal Replacement

Should any door seals show signs of damage or deterioration, replace with a new seal. Locate the new seal on threaded weld studs and replace access door. Replacement seals can be quoted by referencing the unit drawing number above.

EMCEL Filters Limited

Important Safety Notice

Before commencing any work on these units ensure that the correct personal safety equipment is worn and all tools required are available. (see below)

Personal Safety Equipment required:

Safety Helmet
Safety Glasses
Face Mask
Overalls
Hi Visibility Jacket
Gloves
Boots with Toe Protectors

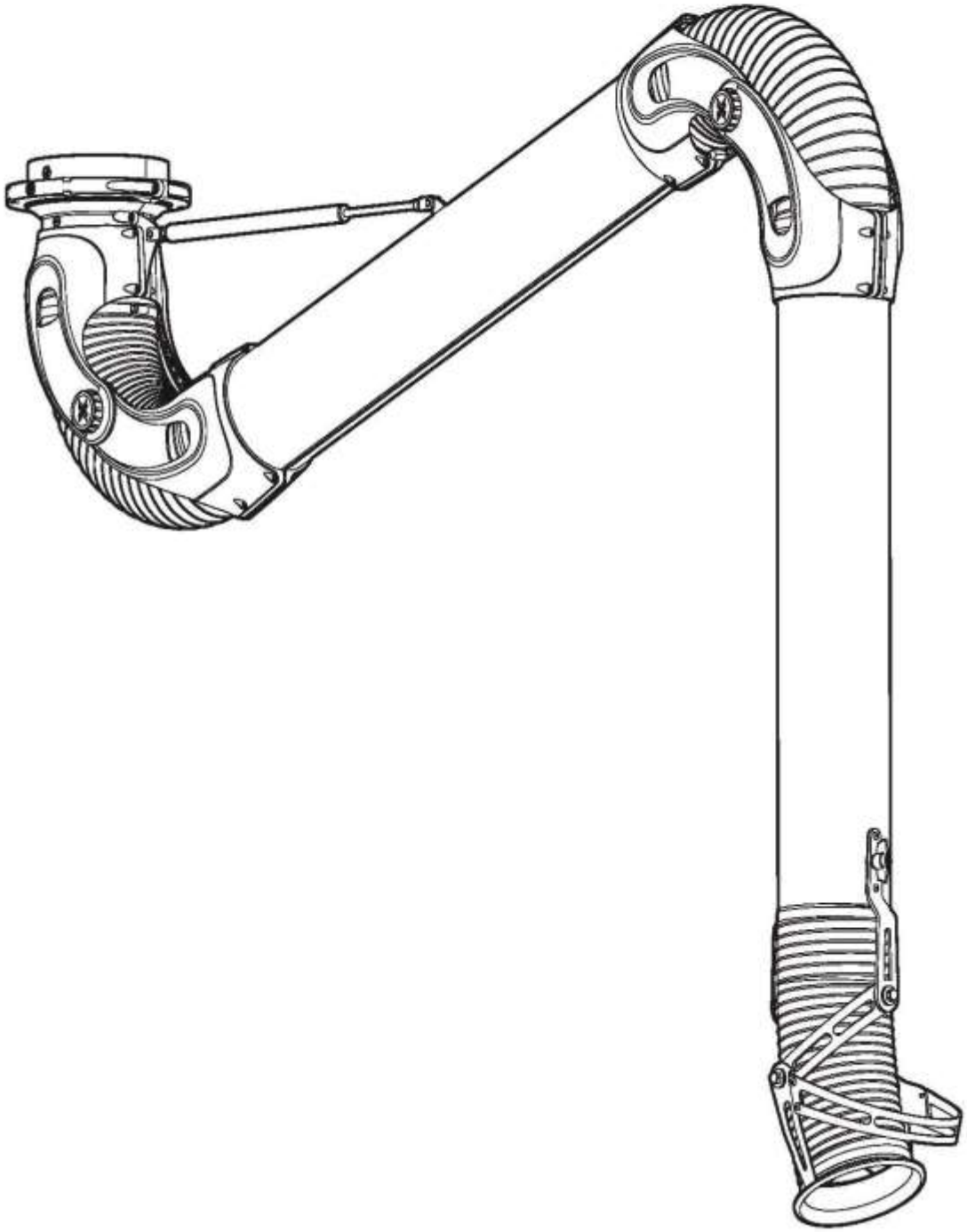
Tools Required:

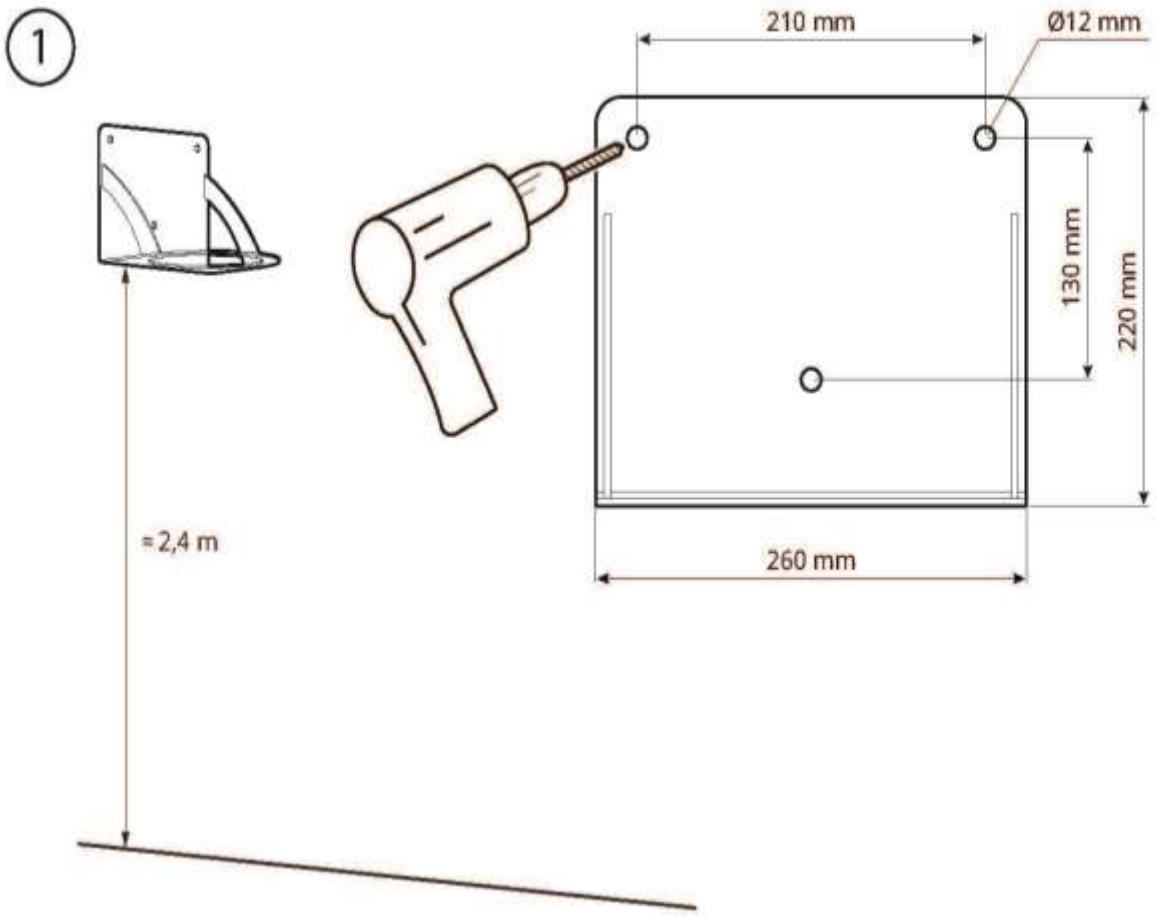
M6 Spanner or Power Socket Drive (Doors)
M8 Spanner or Power Socket Drive (Units)
Vacuum Cleaner (General use)

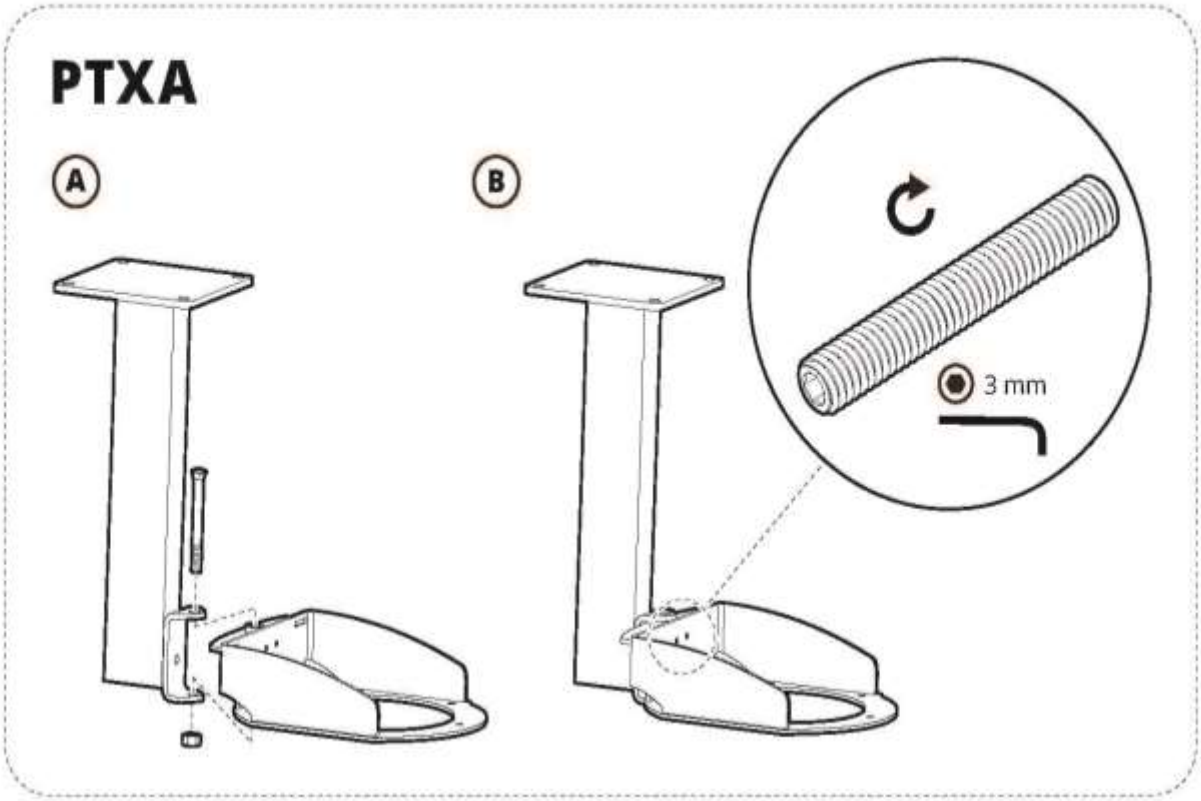
SECTION NO.6.

EXTRACT ARMS.

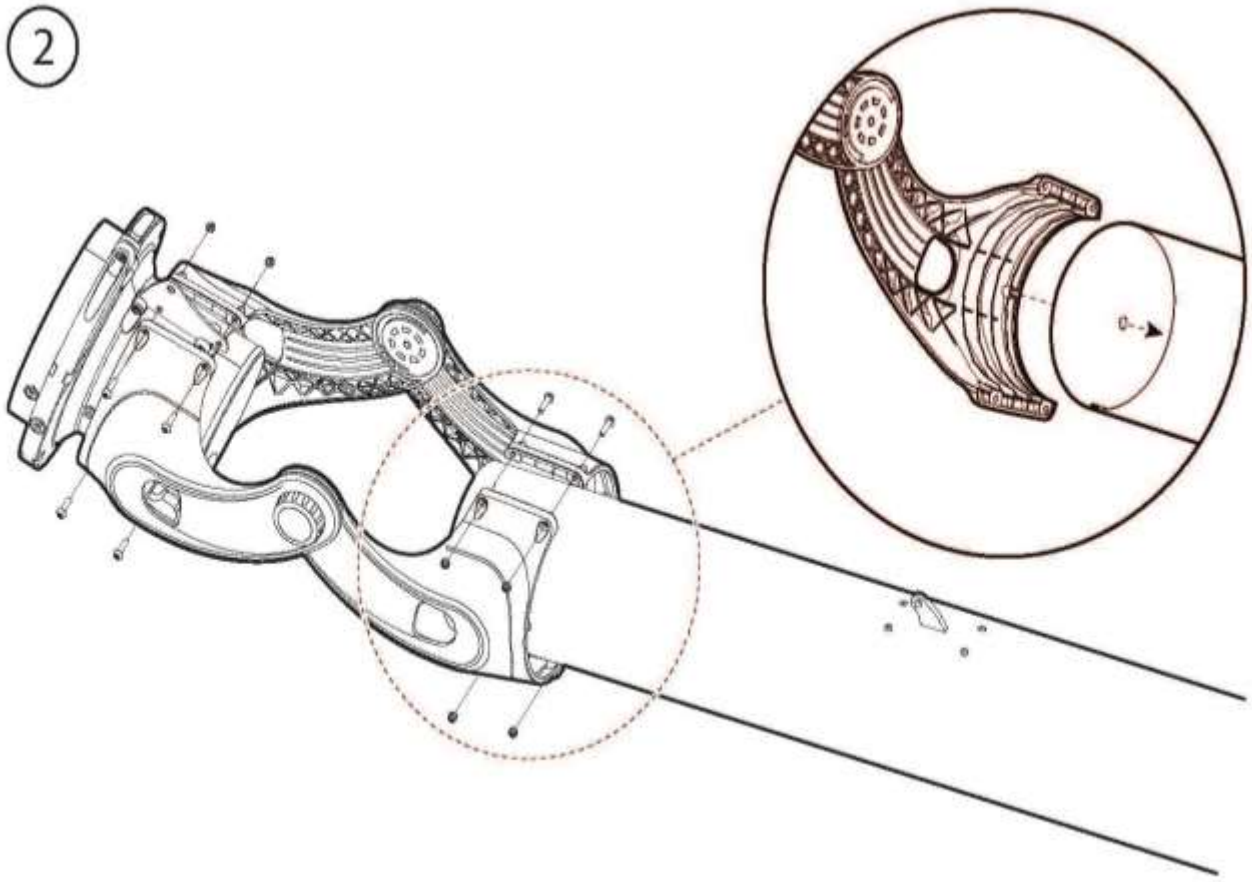
PRX
2000/3000/4000
INSTALLATION MANUAL




1
210 mm
Ø12 mm
130 mm
220 mm
≈2,4 m
260 mm


PTXA
A
B
3 mm

2



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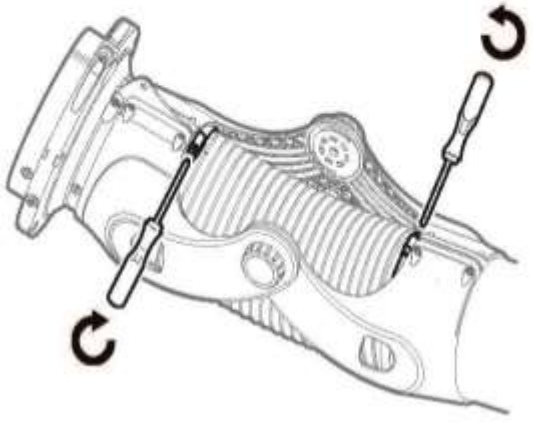

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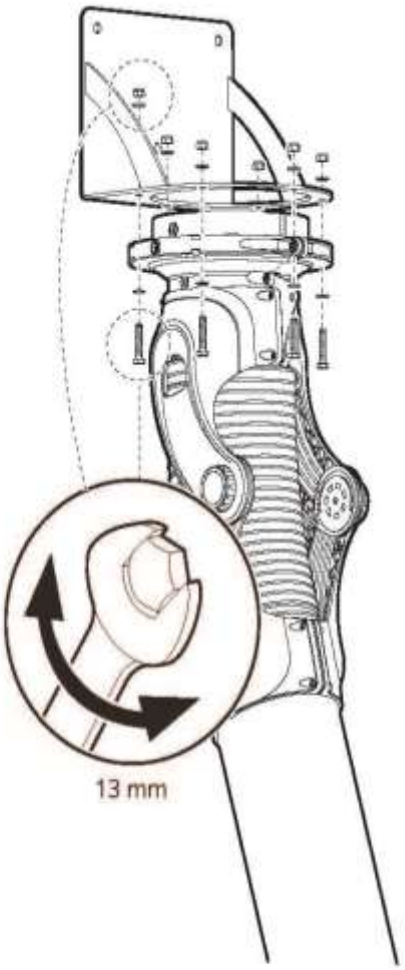

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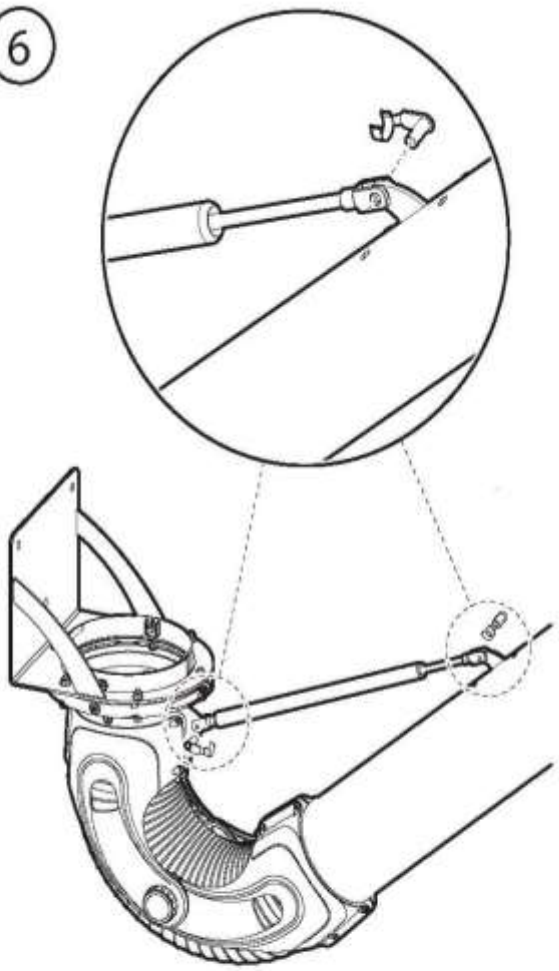

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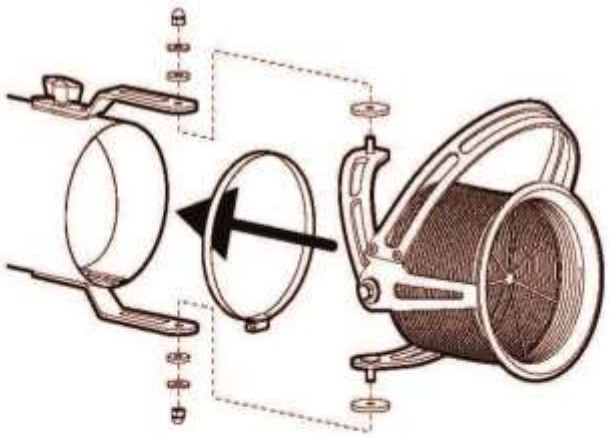

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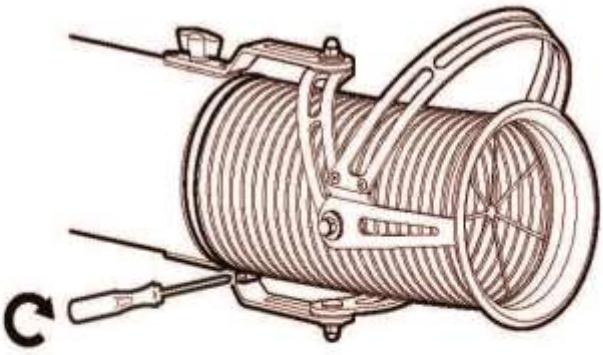

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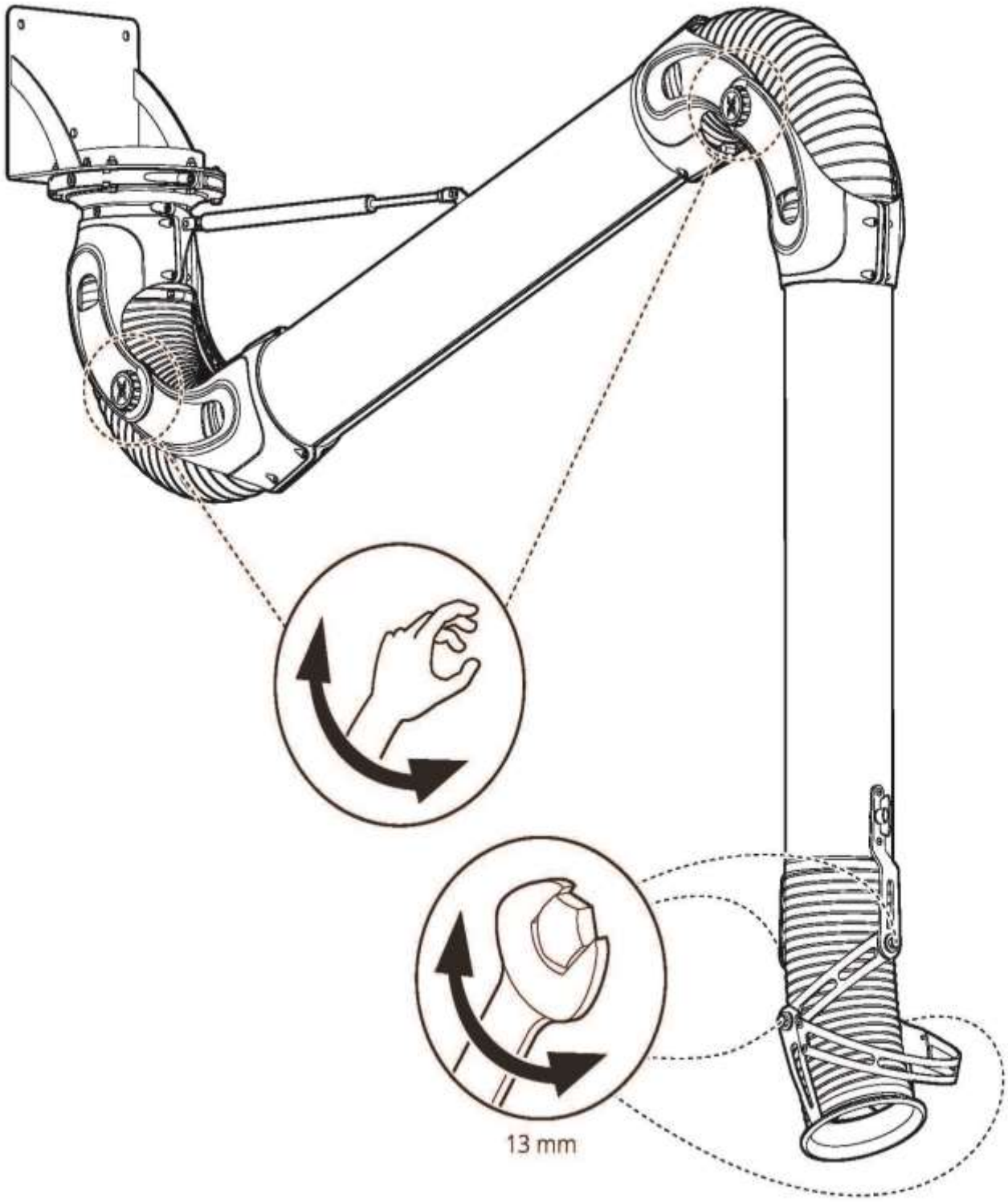

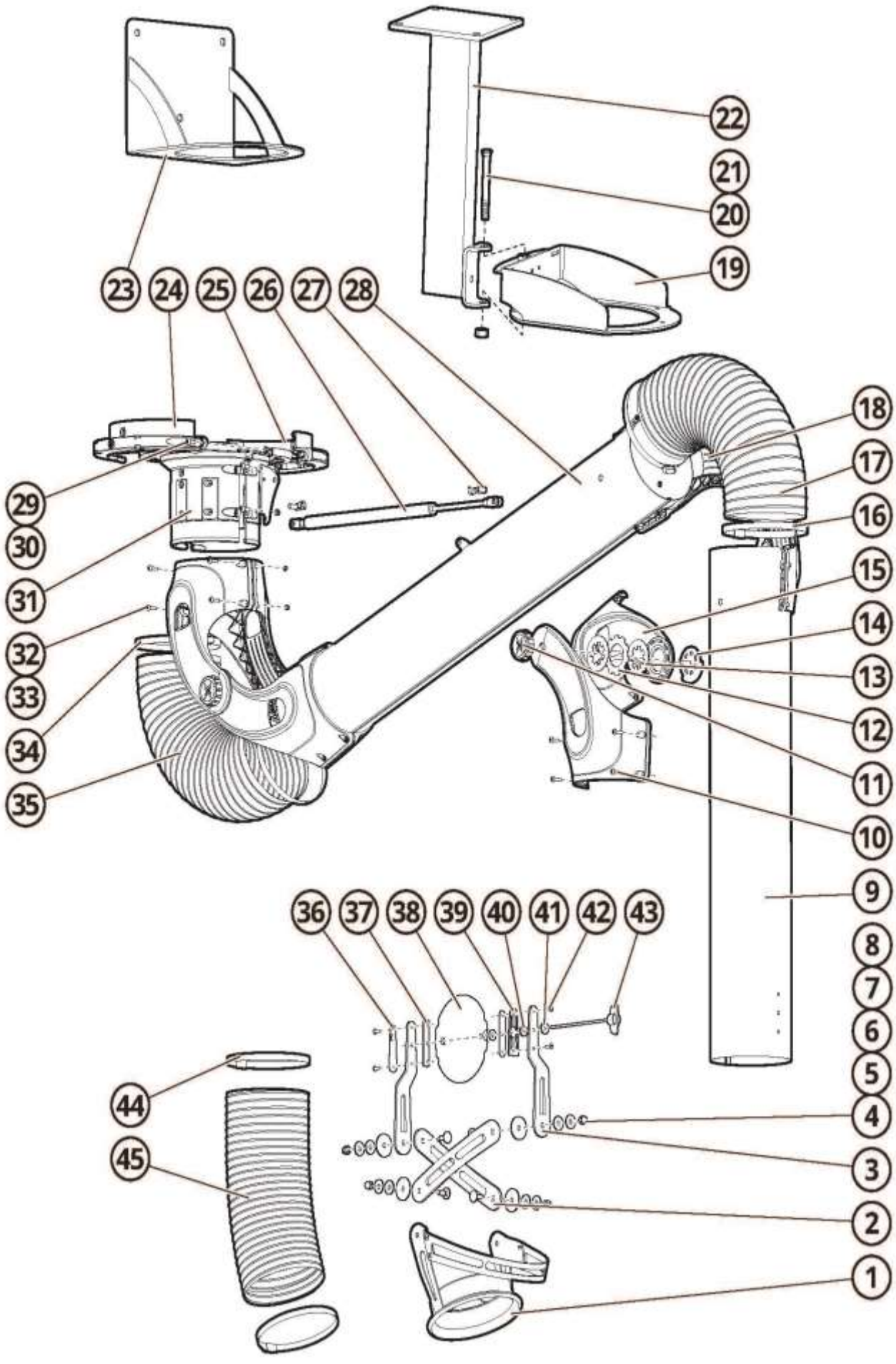
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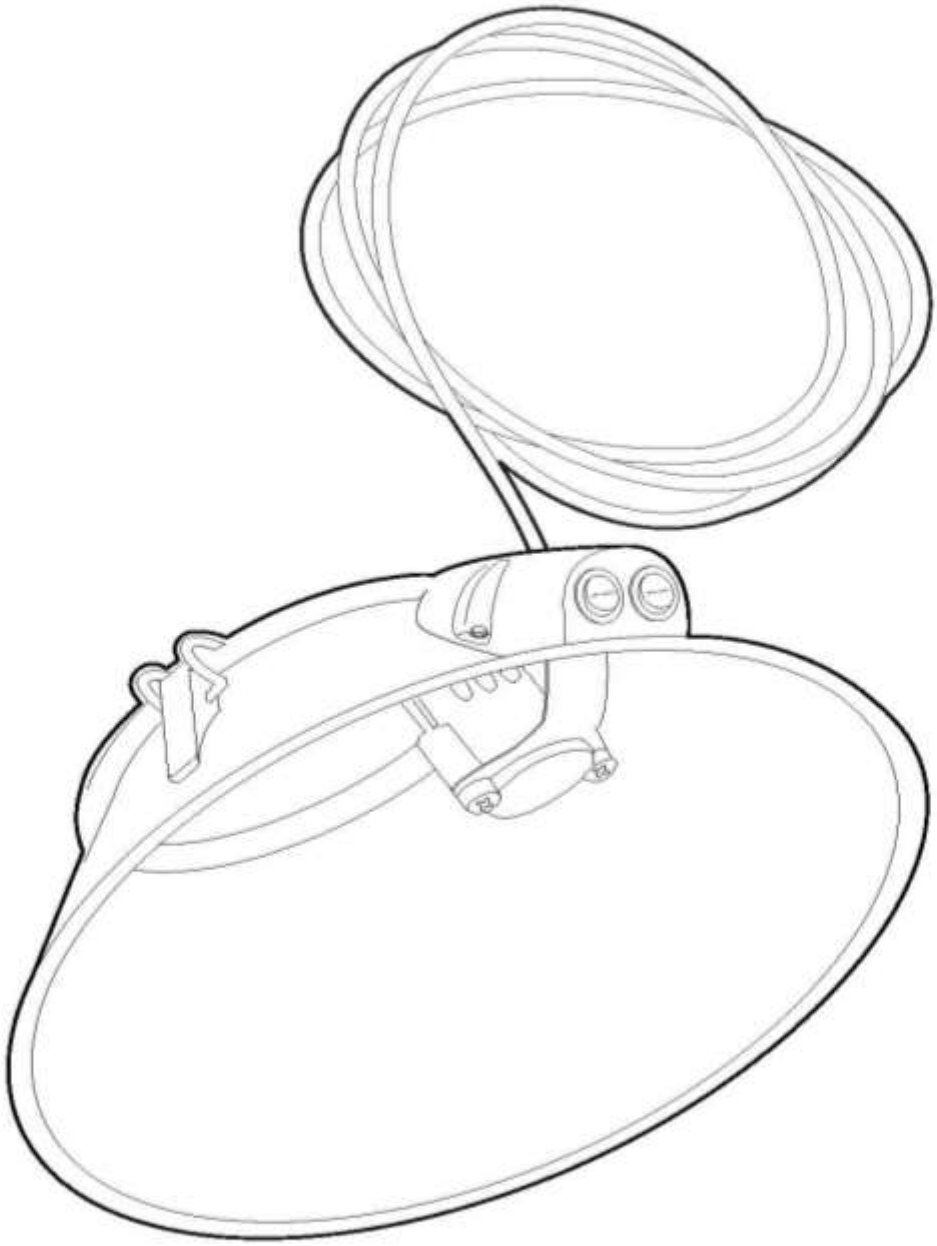
Installation+

PK LED | T | LED/T



MOVEX® EQUIPMENT

MOVEX PK LED | T | LED/T

General

Electrical components may only be installed by a qualified electrician.

Maximum one lamp can be connected to the power supply.

Push Button Kit **PK T**, **PK LED** and **PK LED/T** is developed for easy starting / stopping of example lamp, fan and damper. If running the **LED** lamp use the enclosed power supply.

Power supply has built-in AC/DC Converters and supplies the **LED** with a constant current (350mA).

Installation

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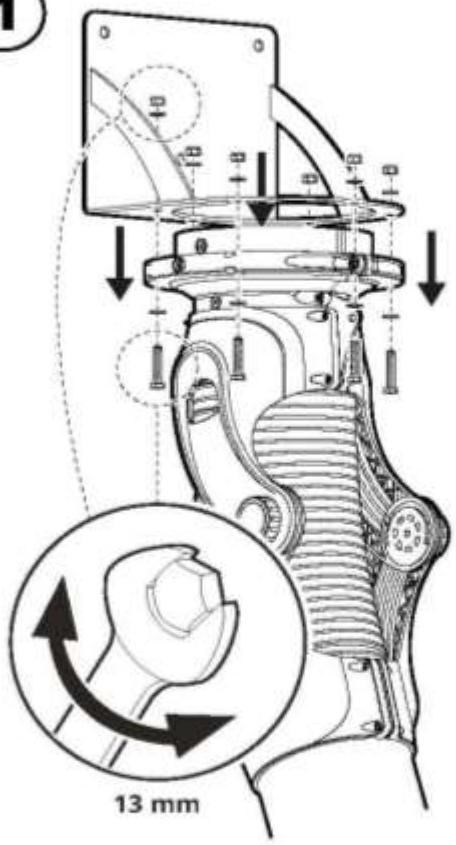

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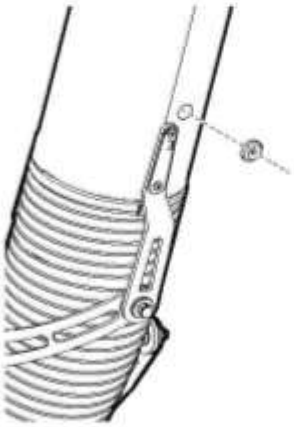

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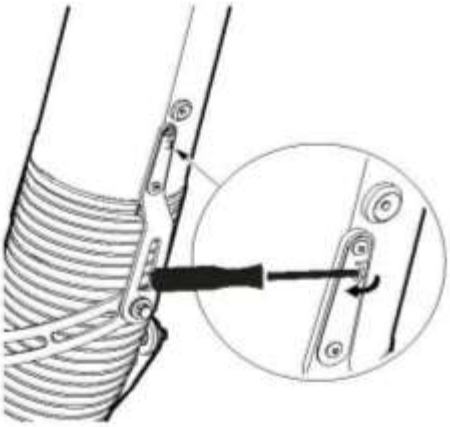

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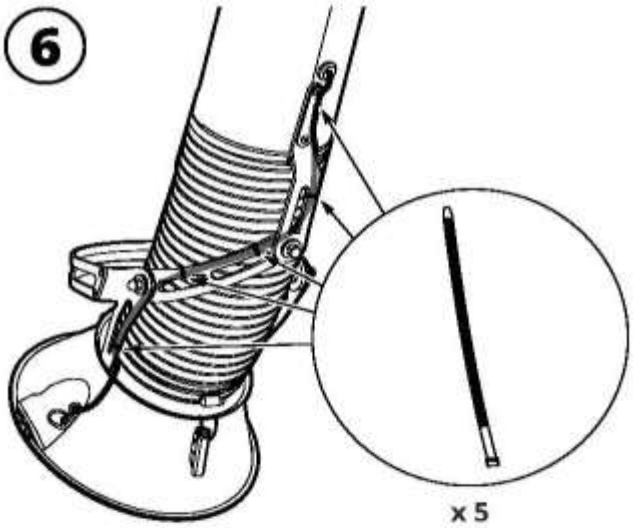

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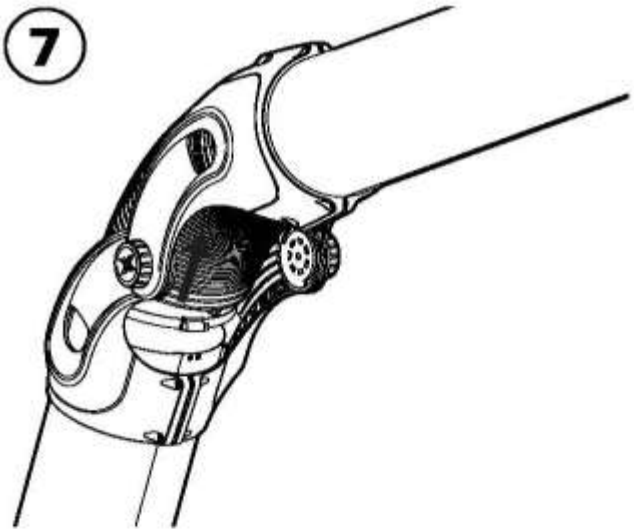

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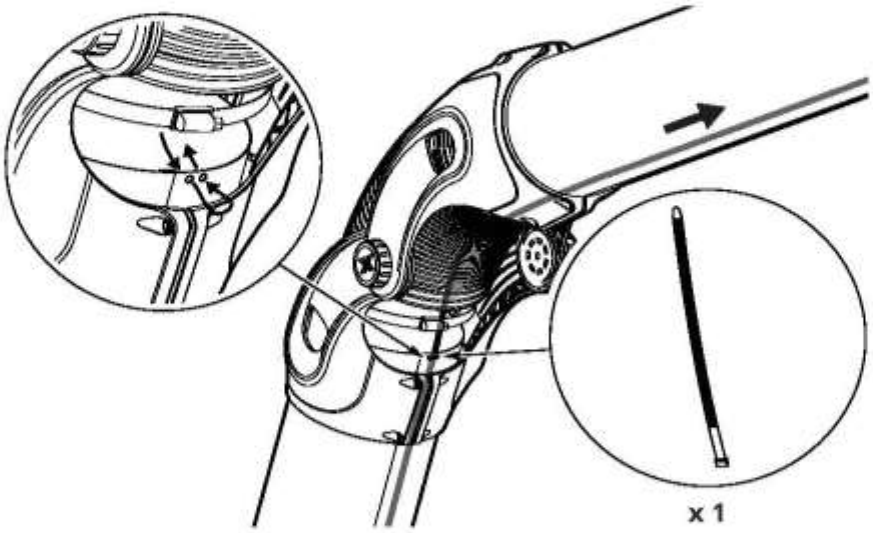

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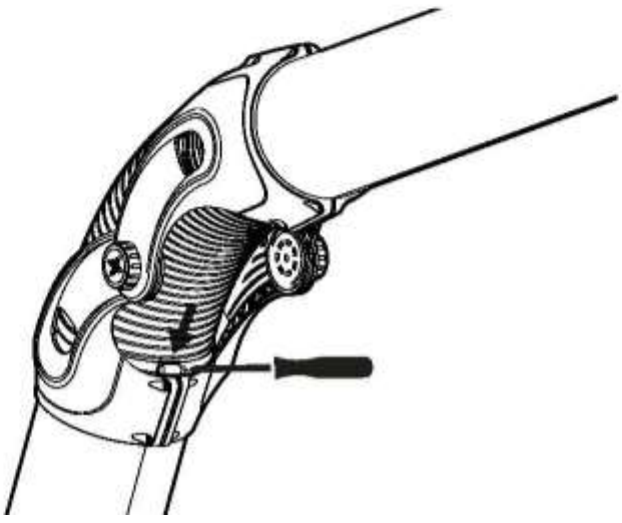

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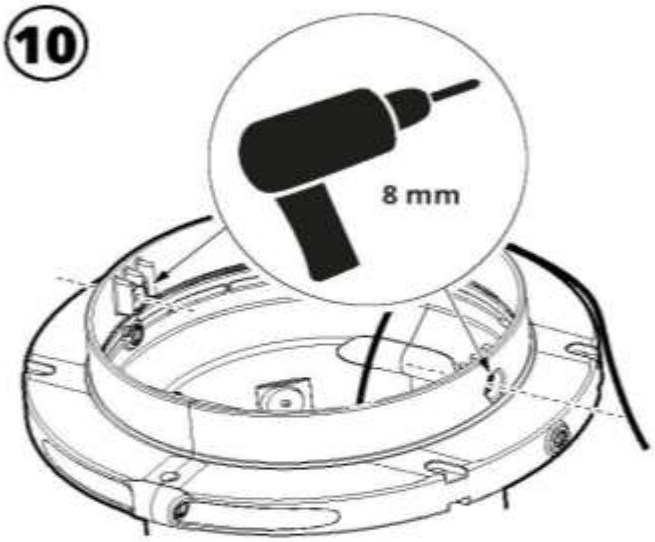

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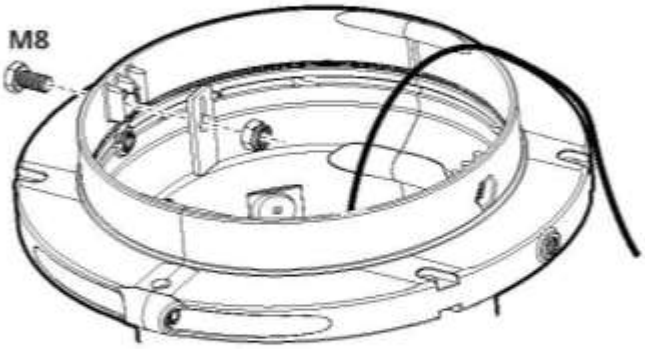

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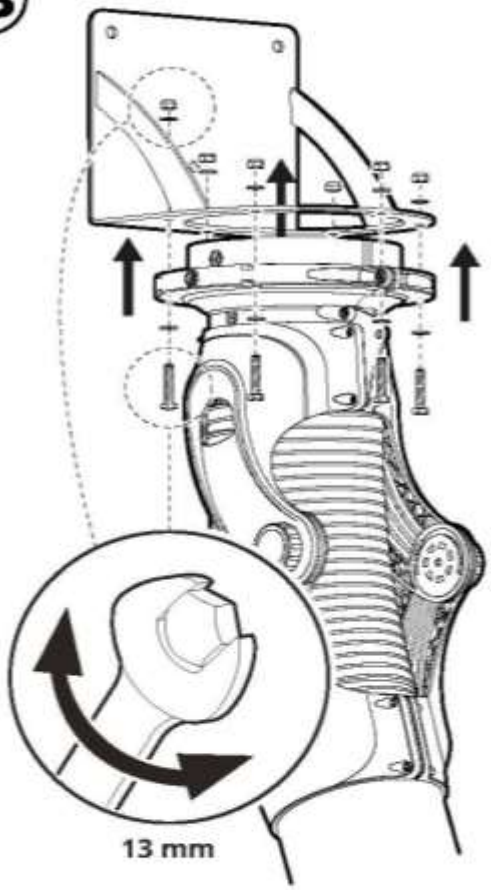

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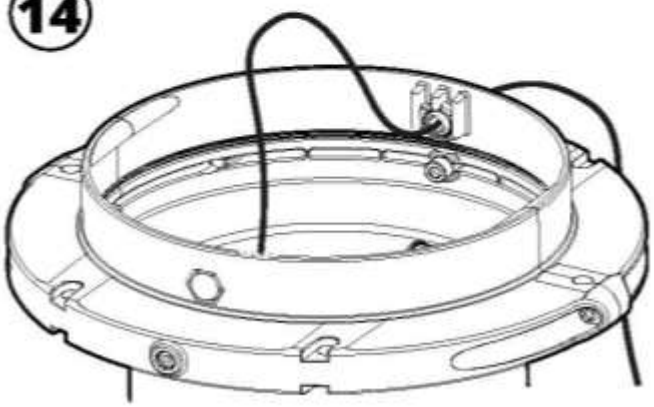
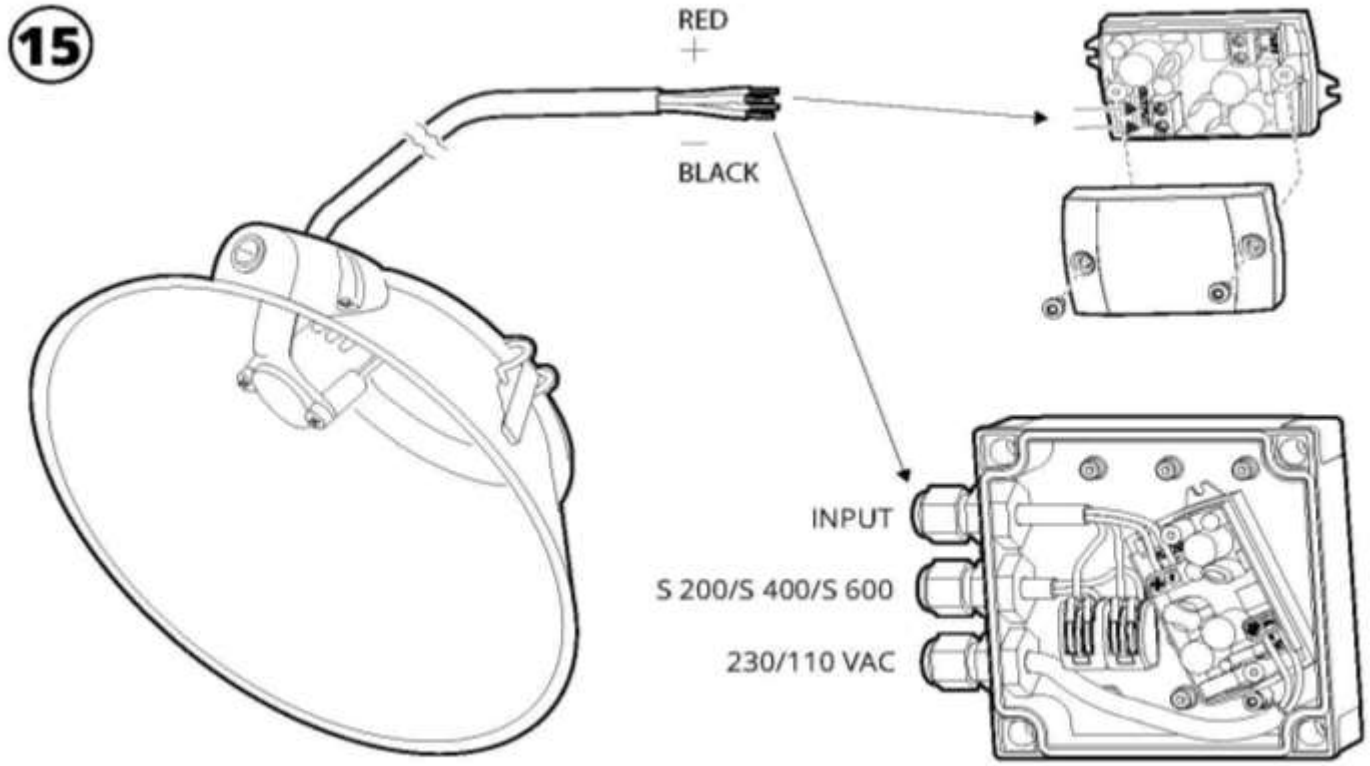
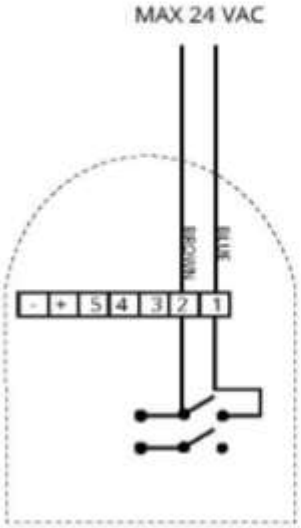


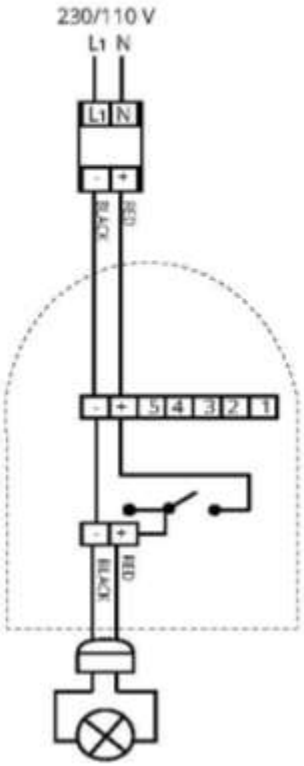


Schematics

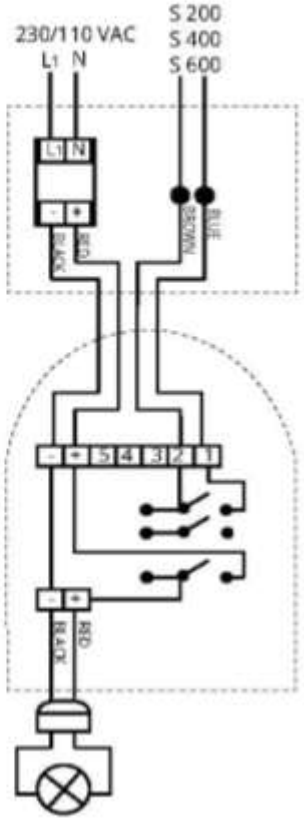
PK T



PK LED



PK LED/T



Technical data

Installation

Terminal INPUT ..... 100-240V 1N~ (1).
Terminal OUTPUT ..... 3-21VDC @350mA (2)
Effect: ..... Max 6W
Frequency: ..... 50-60 Hz
Terminal: ..... Max 1,5 mm2/terminal
Ambient temp.: ..... 0 to +50°C
Weight: ..... 33 gram

Meets requirements

Lighting materials - General: ..... EN 61347-1
Lighting materials - Safety: ..... EN 61347-2-13
RoHS directive: 2011/65/EU

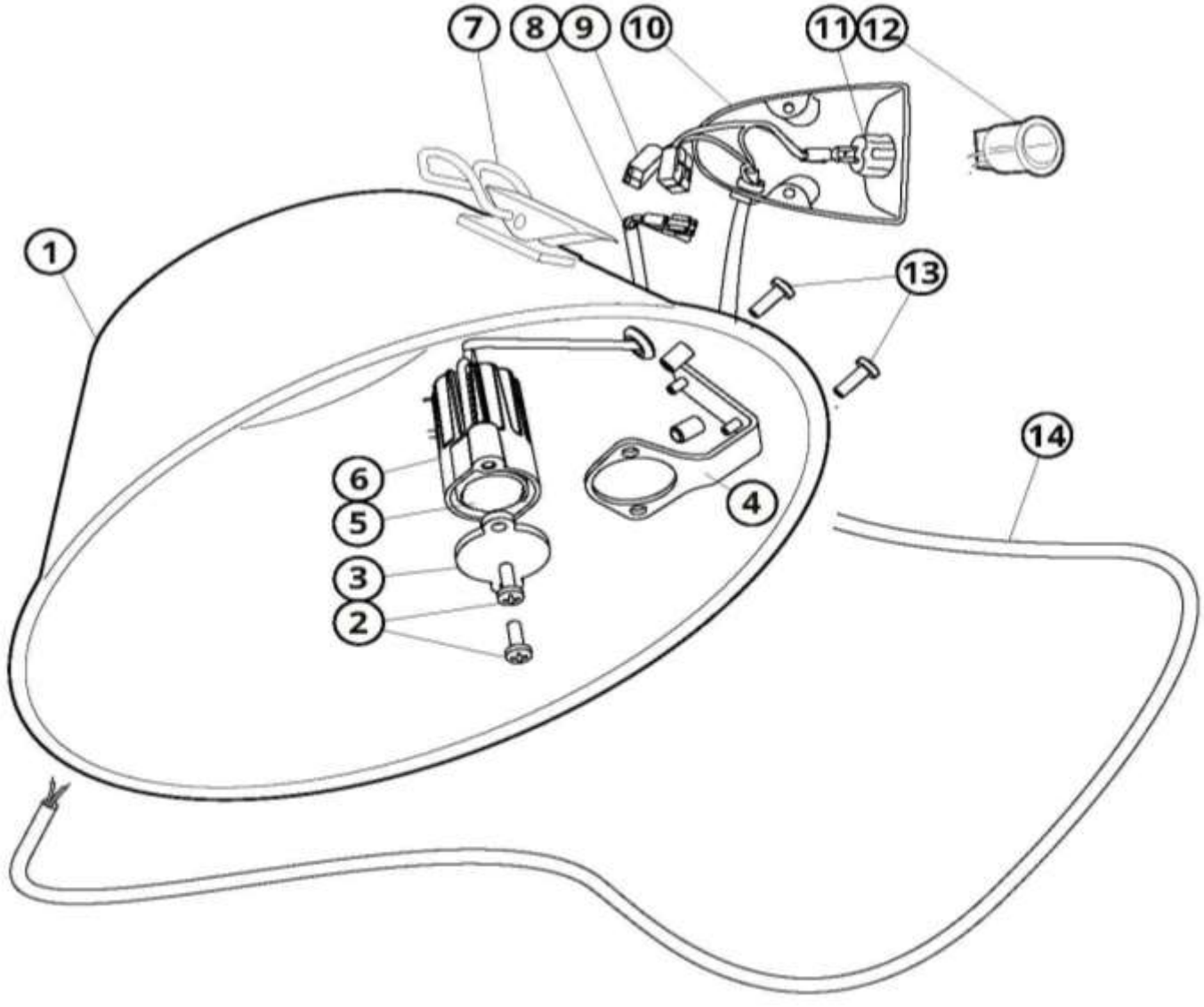
Housing

Material: ..... PCB
IP Rating: ..... IP 20
Dimension: ..... 68x36x21 mm

Maintenance

Maintenance free

Exploded view



SECTION NO.7.

ELECTRICALLY ACTUATED LEG DAMPERS.

Fr. Jacob Söhne GmbH & Co. KG
Niedernfeldweg 14
32457 Porta Westfalica
Germany

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www.jacob-rohre.de

JACOB
NO. 1 IN PIPEWORK SYSTEMS

Documentation – english translation

Throttle valve without seal, electrically operated by means of adjustable drive make Air Torque 24V AC/DC und 90 - 240V AC

Part-number

56620607.XX	66620607.XX
56620807.XX	66620807.XX
56621007.XX	66621007.XX
56621207.XX	66621207.XX
58521407.XX	68521407.XX
58521507.XX	68521507.XX
58521707.XX	68521707.XX
58522007.XX	68522007.XX
58522207.XX	68522207.XX
58522507.XX	68522507.XX
58522807.XX	68522807.XX
58523007.XX	68523007.XX
58523107.XX	68523107.XX
58523507.XX	68523507.XX
58524007.XX	68524007.XX

XX = Current: 73 = 230V AC
74 = 24V DC

Documentations-no. – 75667202 01/2017

QUICK CONNECT®

FOOD GRADE
EG/EC 1935/2004 plus FDA

DETECTABLE DESIGN

JACOB
NO. 1 IN PIPEWORK SYSTEMS

EG-installing declaration for uncompleted machines acc. guideline 2006/42/EG

We hereby declare that the manufactured throttle valves type:

Throttle valve without seal und throttle valve with seal

Are in accordance with all mostly required guide lines Machines (2006/42/EG)

The following harmonized standards were used:

DIN EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 60204-1	Safety of machinery - electrical equipment of machines Part 1: General demands

The special technical documentation for the machine was made out acc. appendix VII part B.
We oblige ourselves to submit this documentation for uncompleted machines to the individual state authorities.
Party responsible for documentation: Ewald Höinghaus, Tel.: + 49 571 9558-279

Porta Westfalica, 02.01.2017

Dr. Ing. Uwe Braun
Managing Director

Fr. Jacob Söhne GmbH & Co. KG
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Germany

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TÜV NORD

Operating instructions

Throttle valve without seal,

electrically operated by means of adjustable drive

Content

1. Hazard indications
2. Disposal
3. Product data
4. Description without mounting parts
5. Application
6. Assembling / Setting into work
7. Transport and storage
8. Maintenance / Cleaning
9. Spare Parts
10. Mounting parts
11. Main dimensions

Attachments

EG-installing declaration Jacob
Manufacturers-documentation for:
- electrical drive Adjustment

1. Hazard advice

The inner flap represents a potential hazard
Operation without being mounted as part of a pipe-line is prohibited (danger of damage).
Setting into operation is only permitted as soon as pipes or apparatuses are connected the inlet and outlets. The plant operator has to make sure that the security distances resp. activities comply with the valid prescriptions

The shut-off valves must not be installed with the actuator facing downward

The connections must not exert unpermissible forces on the apparatus.
The dimensioning of the connections does not allow any additional forces e.g. climbing onto the pipe-line.

In case the surface-temperature of accessable parts is outside of -10 °C up to + 70 °C, these have to become protected at site or provided with warning advices.

Any alteration of the apparatus, when being delivered, is prohibited.
Any utilization deviating from these instructions will be considered as not agreed and releases the manufacturer from his guarantee.

This armature is not fitted with an EMERGENCY - STOP - control unit,
As this does not reduce the risk efficiently.
The plant operator must check whether it makes sense to operate the armature together with the EMERGENCY - STOP of the plant.

To avoid injuries at hand or fingers from sharp-edged pipe ends or swaged lips, protection gloves have to be used during assembling and disassembling

Hazard advices for the mounting parts (electrical drive adjustment) can be found out of the attached information of the manufacturer.

2. Disposal

No hazardous or poisonous materials have been used to which special attention had to be paid in case of disposal.
See information of manufacturer for disposal of mounting parts (electrical drive adjustment).

3. Product data

Throttle valve without seal

Material: **steel powder-coated**
Connections: **Lips for pull-ring connection**

Material: **stainless steel 1.4301**

Diameter: ..... **80, 100, 120, 140, 150, 175, 200, 224, 250, 280, 300, 315, 350, 400 mm**
Ambient temperature: **-20°C - +80°C**

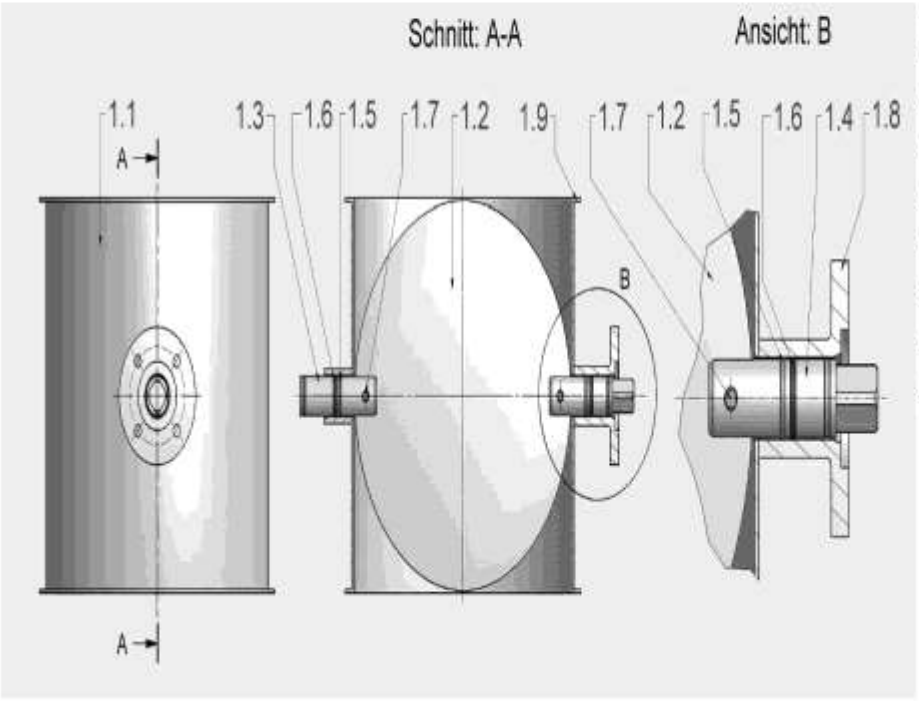
Material thickness: **1,5 mm**
2 mm
Temperature of conveyed good : **-20° - +120°C**

Operation:

Electrical drive adjustment:

Usage:	Ø60 – Ø150	Ø60 – Ø150	Ø175 – Ø400	Ø175 – Ø400
Make:	Air Torque	Air Torque	Air Torque	Air Torque
Type:	ER20	ER20	ER60	ER60
Nominal current	230 V / 50 Hz	24 V AC / DC	230 V / 50 Hz	24 V AC / DC
Capacity	15 W	15 W	45 W	45 W
Torque:	20 Nm	20 Nm	60 Nm	60 Nm
Running time 90°:	11 s	11 s	12 s	12 s
Protection:	IP 66	IP 66	IP 66	IP 66
Ambient temperature:	-10°- +55°C	-10°- +55°C	-10°- +55°C	-10°- +55°C
Connecting flange:	F03- F04- F05	F03- F04- F05	F05- F07	F05- F07
Electrical connection:	1 x cable screwing ISO M20			

Throttle valve without seal
4. Description without mounting parts



1.1 Valves casing
1.2 Inner flap
1.3 Shaft
1.4 drive shaft SW 14
1.5 O-ring Viton
1.6 O-ring EPDM- conductive
1.7 Hexagon socket screw
1.8 Connecting flange
1.9 Swaged end for pull-ring connection

Version:

The throttle valve without seal is available from diameter 60 mm up to 400 mm.
In ø 60 – ø300 is the casings' thickness 1,5 mm, in ø 315 – 400 is the casings' thickness 2mm,
the inner flap is 5 mm thick.
The shafts are sealed by means of one O-ring made from Viton and one O-ring made from EPDM, both conductive.
The O-rings are made from material EPDM conductive to deflect static load on the inner flap to the casing.
The permissible temperature of the O-ring EPDM is120°C.

5. Application

The throttle valves are used for shutting off of air. Only with restriction it can be also used for shutting off of dry bulk goods by gravity.
The air to be conveyed may contain contaminants. These must however not be aggressive and they must not effect the seal or the glue of the seal at the casing of the valve.
A low regulation is only possible with a respective control.
The valve does not close absolutely tight, leakages must be expected.

Pressures:
The permissible working over-and under pressure inside of the casing is 0.5 bar.

6. Assembling / Setting into work

Prior to installation the apparatus has to be checked for possible damages..

Installing position:
The valve can be installed in any position, provided the actuator does not face downward.

The apparatus is not layed out for outdoor installation. In case of such, a suitable weather protection has to be provided.

Setting into work has to be carried out according the companys' saftey instructions.
The manufacturers' instruction for setting into work (electrical drive adjustment) are to be taken into consideration.

7. Transport and storage

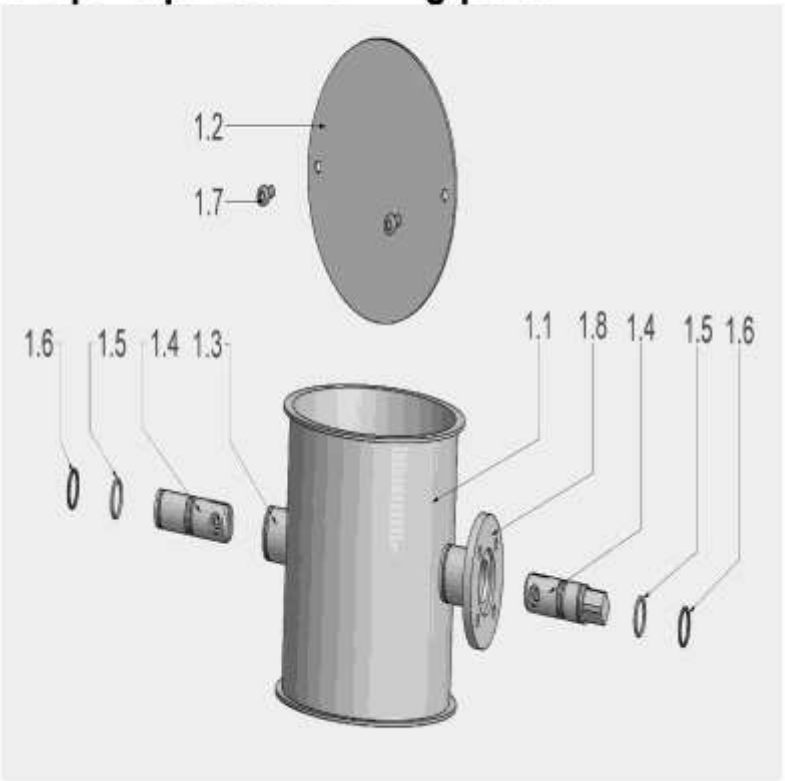
Since the freight forwarders are responsible for damages and late deliveries, the recipient must, if necessary, issue a caveat prior to acceptance. Deliveries ex-factory is subject to the same conditions.
In-house transport shall be such that damage to the equipment is excluded.
Storage shall be in a clean, ventilated and dry place, preferably on transport pallets or on shelves.

8. Maintenance / Cleaning

Depending on the conveying goods and the switching frequency, the valve has to be checked regularly in respect of abrasion of the seal, the inner flap and the casing.
In case of appearance of abrasion the casing of the valve should be replaced.

Static build-ups of the inner flap are derived by design on the O-ring of EPDM conductive to the housing.
When cleaning the system internally no aggressive acids or alkalis may be used, which might effect negatively the casing or the O-rings.
For security reasons the screw connection of the inner flap 1.2 with the shaft ends 1.3 and 1.4 must be fixed at M6 with a torque of 18 Nm and at M5 with a torque of 12 Nm, and must be additionally fixed with Loctite.
Necessary maintenance work of the mounting parts (electrical drive adjustment) is to be found in the respective manufacturer-instructions.

9. Spare parts / Working parts



Version Ø60 - Ø100:

pos. 1.5 2 x O-ring Ø12x2,.Viton
no. 8.56.016.008

pos. 1.6 2 x O-ring Ø12x2, EPDM-conductive
no. 8.56.011.0085

Version Ø120 – Ø400

pos. 1.5 2 x O-ring Ø18x2, Viton
no. 8.56.016.020

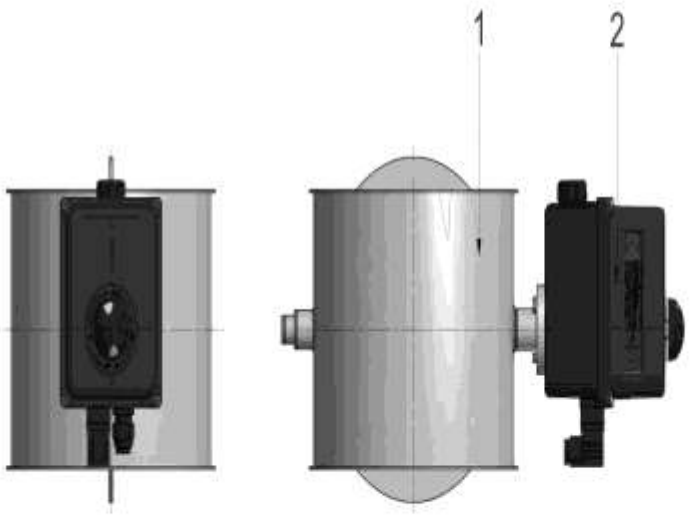
pos. 1.6 2 x O-ring Ø18x2, EPDM-conductive
no. 8.56.011.0205

For security reasons the screw connection of the inner flap 1.2 with the shaft ends 1.3 and 1.4 must be fixed at M6 with a torque of 18 Nm and at M5 with a torque of 12 Nm, and must be additionally fixed with Loctite.

10. Mounting parts

Electrically operated by means of actuator betätigt mittels Stellantrieb

1.0 Throttle valve without seal
2.0 electrical actuator

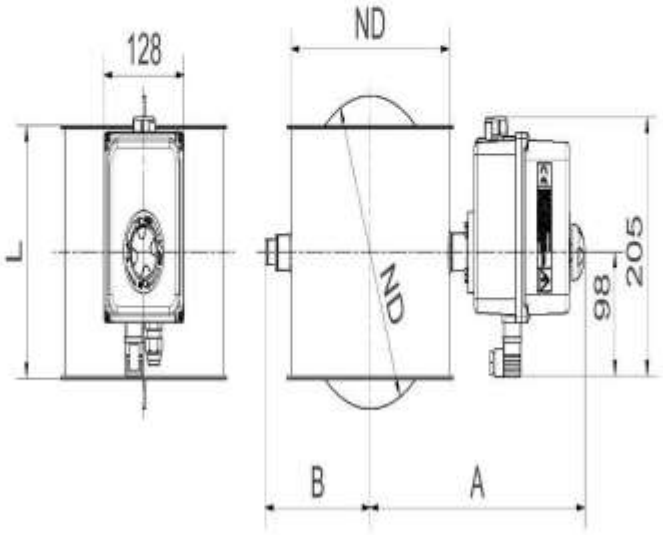


Please find the description of the mounting parts under 3. Product data, construction- and type descriptions.
The operation of the inner flap is done by means of an electrical actuator with an operating angle of 90°.

Electrical Actuator (2.0)

The actuator is fitted with 2 off position-switches. Furthermore it is fitted with a hand-wheel for auxiliary operation.
In case of higher temperatures of the conveying goods, the actuator has to be protected against unacceptable heating up at site.
For a better insulation, the actuator, as a special make, can be fitted 100 mm away from the casing).
Further binding advices see manufacturer's information on the attached documentation.

11. Main dimensions



DN	60	80	100	120	140	150	175	200
A	239	250	261	278	286	292	305	318
B	63	75	85	103	111	118	131	143
L	60	100	100	120	140	150	175	200
Gew. In kg	2,8	3,0	3,2	3,7	4,0	4,2	4,7	5,3

DN	224	250	280	300	315	350	400	
A	328	343	356	368	374	393	417	
B	153	168	182	193	199	218	242	
L	200	200	200	200	200	200	200	
Gew. In kg	5,7	6,3	6,8	7,3	8,4	9,4	10,8	

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MISE EN SERVICE

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Im Katzentach 16-18
DE-76275 Ettlingen

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Fax: +49 (0)7243 5934 34
Email: info@airtorque.de

INSTRUCTIONS AND SECURITY

DESCRIPTION

These electric actuators have been designed to perform the control of a valve with 90° rotation. Please consult us for any different application. We cannot be held responsible if the mentioned actuators are used in contradiction to this advice.

TRANSPORT AND STORAGE

- The forwarding agents being held as responsible for damages and delays of the delivered goods, the consignees are obliged to express if applicable their reserves, prior to accept the goods. The goods delivered directly ex works are subject to the same conditions.
- The transport to the place of destination is carried out by using rigid packing material.
- The products must be stored in clean, dry, and ventilated places preferably on appropriate palettes or shelves.

MAINTENANCE

- Maintenance is ensured by our factory. If the supplied unit does not work, please check the wiring according to the electric diagram as well as the power supply of the concerned electric actuator.
- For any question, please contact our after-sales service.
- To clean the outside of the actuator, use a lint and soapy water.
  DO NOT USE CLEANING PRODUCT WITH SOLVENT OR ALCOHOL

GUARANTEE

- 100% of the actuators are fully tested and set in the factory.
- These products are guaranteed two years from the delivery date or 50,000 operating cycles against all types of manufacturing and material faults (operating time and model class according to standard CEI34).
- This guarantee will only be valid if the unit has not been disassembled or self-repaired during its service life. It does not cover any wear and damage caused by shocks or faulty operation neither by the use of the unit under conditions not in accordance with its nominal characteristics. The guarantee is strictly limited to the replacement of original parts found defective on checking by our service personnel. The cost of shipping to our premises, the return of devices to the customer as well as the repair cost will be chargeable. We will not assume the responsibility for any direct or indirect accidents/risks originated by a failure of our products. The guarantee does not cover the consequences of breakdown and excludes any payments for indemnities. The accessories and adaptations are excluded from the guarantee. In the case where a customer has not proceeded to payments within the agreed period, our guarantee will be suspended until the delayed payments have been received and with the consequence that this suspension will not prolong the guarantee period in any case.

RETURN OF GOODS

- The customer is obliged to check the conformity of the goods with regard to their definition at the time of delivery.
- The acceptance of the goods by the purchaser disclaims the supplier of all responsibility if the purchaser discovers any non-conformity after the date of acceptance. In such case, the repair cost will be borne by the purchaser who will also exclusively bear all financial consequences of any resulting damage. Returned goods will only be accepted if our prior agreement has been given to this procedure : the goods must be sent free of all cost and being shipped solely and in their original packing. The returned goods will be credited to the purchaser with a reduction of 20% on the unit's price charged in accordance with the original invoice of the returned goods.

SAFETY INSTRUCTIONS

To be read prior to the installation of the product

- The electric power supply must be switched-off before any intervention on the electric actuator (i.e. prior demounting its cover or manipulating the manual override knob).
- Any intervention must only be carried out by a qualified electrician or other person instructed in accordance with the regulations of electric engineering, safety, and all other applicable directives.
- Strictly observe the wiring and set-up instructions as described in the manual: otherwise, the proper working of the actuator can not be guaranteed anymore. Verify that the indications given on the identification label of the actuator fully correspond to the characteristics of the electric supply.

- Do not mount the actuator « upside down ».

Risks:

Declutching mechanism failure

Possible flow of the grease on the electronic board

- Do not mount the actuator less than 30 cm of a electromagnetic disturbances source.

POSITION INDICATOR EN
STELLUNGSANZEIGE D
INDICADÓR DE POSICIÓN ES

INDICATEUR DE POSITION

Indicateur modulable, livré avec 5 repères de signalisation (3 jaunes + 2 noirs), à positionner en fonction du type de vanne à piloter.

Modular position indicator with three removable position markers **(3 yellow + 2 black)**, *adjustable according the type of valve to be actuated.*

Stellungsanzeige mit 5 einstellbaren Markierungsknöpfen (3 gelbe + 2 schwarze), die je nach Armaturtyp zu positionnieren sind

Indicador modulable, entregado con 5 marcas de señalización (3 amarillos y 2 negros), a colocar con arreglo al tipo de válvula a maniobrar

poignée avec indicateur de position pour ER20
Handle with position indicator for ER20
Hebel mit intergrierter Stellungsanzeige für ER20
puñado con indicador de posición para ER20

Indicateur de position pour ER35-60-100
Position indicator for ER35-60-100
Stellungsanzeige fur ER35-60-100
Indicador de posición para ER35-60-100

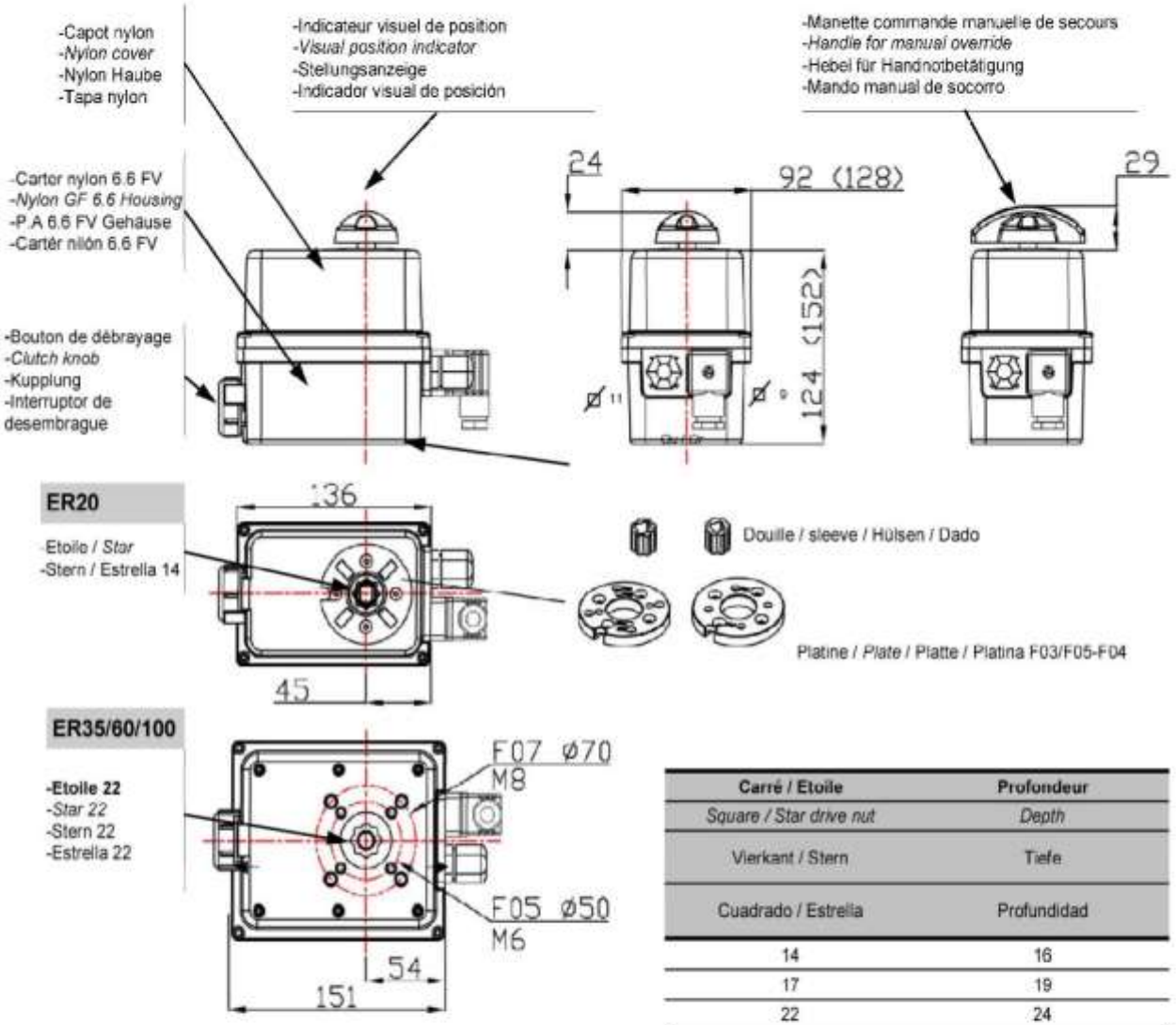
Vanne 2 voies en position fermée
2 ways valve in closed position
2 Wege Armatur in Zu Stellung
Válvulas de 2 vias en position cerrada

Vanne 3 voies de type L
3 ways L type valve
3 Wege Ventil Typ „L"
Válvulas de 3 vias de tipo L

Vanne 3 voies de type T
3 ways T type valve
3 Wege Ventil Typ „T"
Válvulas de 3 vias de tipo T

ENCOMBREMENTS

EN **DIMENSIONS**
D **DIMENSIONEN**
ES **DIMENCIONES**

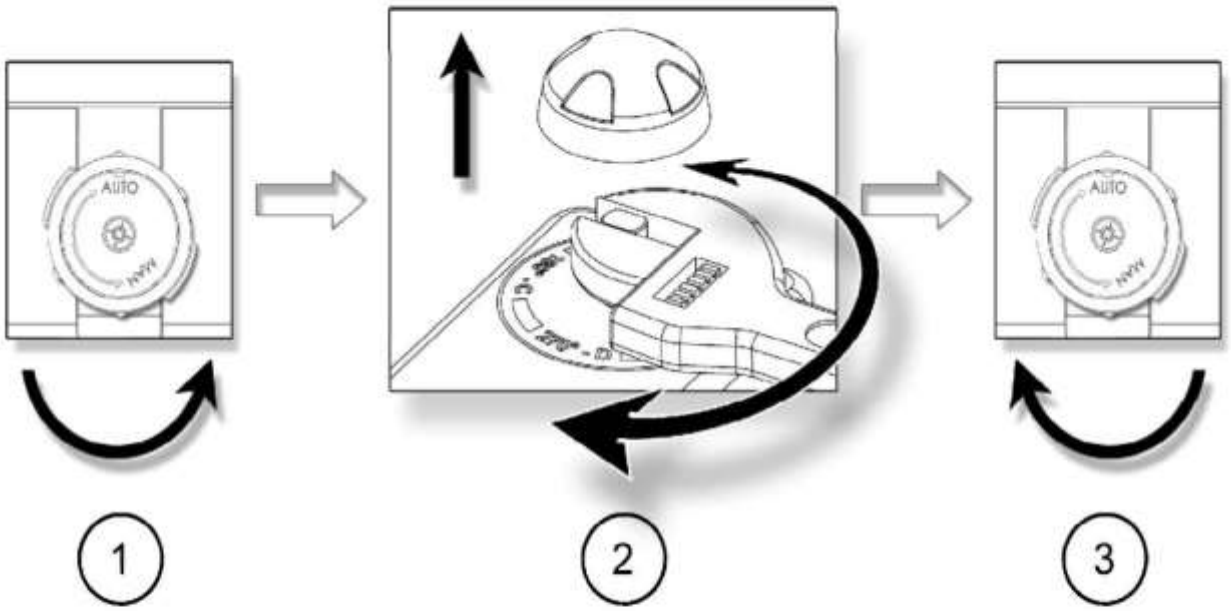


Carré / Etoile	Profondeur
Square / Star drive nut	*Depth*
Vierkant / Stern	Tiefe
Cuadrado / Estrella	Profundidad
14	16
17	19
22	24

Fixation ISO F	Diamètre	Taraudé M	Profondeur	Nombre de vis
ISO F flange	*Diameter*	*M threaded*	*Depth*	*Screws quantity*
ISO F Anschluss	Diameter	M Gewinde	Tiefe	Anzahl der Schrauben
Fijación ISO F	Diámetro	Aterrajado M	Profundidad	Número de tornillos
F03	36	M5	14.2	4
F04	42	M5	14.2	4
F05	50	M6	14.2 / 16.4	4
F07	70	M8	16.4	4

EMERGENCY MANUAL OVERRIDE EN
HANDNOTBETÄTIGUNG D
MANDO MANUAL DE SOCORRO ES

COMMANDE MANUELLE DE SECOURS



FR

L'actionneur fonctionne en priorité électrique. S'assurer que l'alimentation est coupée avant de le manœuvrer manuellement.

1. Tourner le bouton de débrayage vers la position MAN (sens antihoraire) et le maintenir dans cette position.
2. Tourner l'axe sortant de l'actionneur à l'aide d'une clé à molette.
3. Pour revenir en position automatique, relâcher le bouton de débrayage (rappel par ressort).

GB

The priority functionning mode of this actuator is electric. Be sure than the power supply is switched off before using the manual override.

1. Turn the knob to position MAN (counter-clockwise) and hold it in position.
2. Turn the outgoing drive shaft of the actuator with the help of an adjusting spanner.
3. In order to re-engage the reduction, release the knob (spring return).

D

Die Priorität der Funktion des Antriebs ist Automatikbetrieb. Bitte prüfen, dass die Stromversorgung abgeschaltet ist bevor der Antrieb von Hand betätigt wird .

1. Stellen Sie den Schalter auf MAN (gegen den Uhrzeigersinn) um und halten Sie ihn in dieser Position.
2. Drehen Sie die Achse des Stellantriebes mit Hilfe eines Rollgabelschlüssels.
3. Um den Kraftschluss wiederherzustellen, lassen Sie den Kupplungsschalter los (federrückstellend).

ES

El actuador funciona en prioridad eléctrico. Asegurarse que la alimentación es cortada antes de maniobrarlo manualmente.

1. Girar el interruptor de desembrague hacia la posición MAN y mantenerlo en esta posición.
2. Girar el eje saliente del actuador con la ayuda de una llave inglesa.
3. Para reenganchar la reducción, relajar el interruptor de desembrague (retorno por mueles)

BRANCHEMENTS ÉLECTRIQUES

EN ELECTRIC WIRING
D ELEKTRISCHE VERBINDUNG
ES CONEXIONES ELÉCTRICAS

FR **BRANCHEMENTS ÉLECTRIQUES - INSTRUCTIONS** 11
GB ELECTRIC WIRING - INSTRUCTIONS 11
D ELEKTRISCHE VERBINDUNG - INSTRUKTIONEN 12
ES CONEXIONES ELÉCTRICAS - INSTRUCCIONES 12

FR **SCHÉMA ÉLECTRIQUE** 13
GB ELECTRIC WIRING 13
D SCHALTPLAN 13
ES ESQUEMA ELÉCTRICO 13

Symboles utilisés : Danger : risque de choc électrique — Terre de protection — Tension continue — Tension alternative

- Le branchement à une prise de Terre est obligatoire au-delà de 42V suivant la norme en vigueur.
- L'actionneur étant branché en permanence, il doit être raccordé à un dispositif de sectionnement (interrupteur, disjoncteur), assurant la coupure d'alimentation de l'appareil.
- La température du bornier peut atteindre 90°C
- Pour une utilisation avec de grandes longueurs de câbles, le courant induit généré par les câbles ne doit pas dépasser 1mA

Used symbols : Danger : risk of electric shock — Earth protection — Direct voltage — Alternating voltage

- As stipulated in the applicable regulation, the connection to earth contact is compulsory for devices with working voltages exceeding 42 V.
- The actuator is always powered, so it must be connected to a disconnection system (switch, circuit breaker) to ensure the actuator power cut.
- The terminal temperature can reach 90°C
- For a use with a long power supply wiring, the induction current generated by the wires musn't be higher than 1mA

Verwendete Symbole : Gefahr : Gefahr eines elektrischen Schlages — Schutzerdung — Gleichspannung — Wechselspannung

- Die Erdung ist nach der geltenden Norm bei über 42V vorgeschrieben.
- Der Antrieb ist dauerhaft unter Spannung, daher muß beim Anschluß ein Abschaltsystem (Leistungsschalter) vorgesehen werden um die Unterbrechung der Stromzufuhr zu gewährleisten.
- Die Terminal-Temperatur kann bis zu 90°C erreichen.
- Bei Verwendung einer langen Zuleitung für die Spannungsversorgung darf die Induktionsspannung der Leitung nicht größer als 1mA sein.

Símbolos utilizados: Peligro: riesgo de choque eléctrico — Tierra de protección — Tensión continua — Tensión alternativa

- El enchufe a una toma de tierra es obligatorio más allá de 42V según la norma corriente.
- El actuador esta siempre conectado, debe ser empalmado a un dispositivo de seccionamiento (interruptor, disyuntor), asegurando la cortadura de alimentación del aparato.
- La temperatura del Terminal de conexión puede alcanzar 90°C
- Para una utilización con los grandes largo de cables, la corriente induce engendrado por los cables no debe adelantar 1mA

RESPECTER LES CONSIGNES DE SECURITE

Nos presse-étoupe acceptent un câble de diamètre compris entre 7mm et 12mm.

- Retirer l'indicateur visuel, dévisser les 4 vis et retirer le capot.

CABLAGE DE L'ALIMENTATION ET DE LA COMMANDE

- Vérifier sur l'actionneur que la tension indiquée sur l'étiquette correspond à la tension du réseau.
- Connecter les fils sur le connecteur suivant le mode de pilotage souhaité.

CABLAGE DE LA RECOPIE

Nos actionneurs sont par défaut équipés de 2 contacts fins de course auxiliaires secs, soit normalement ouverts, soit normalement fermés (voir schéma électrique DSBL0436). Par défaut, la came blanche est utilisée pour détecter l'ouverture (FC1) et la came noire pour détecter la fermeture (FC2).
Les fins de courses auxiliaires doivent être connectés avec des câbles rigides. Si la tension appliquée est supérieure à 42V, l'utilisateur doit prévoir un fusible dans la ligne d'alimentation.

- Dévisser le presse-étoupe droit et passer le câble.
- Enlever 25mm de gaine et dénuder chaque fil de 8mm.
- Connecter les fils sur le bornier suivant le schéma p.13
- Revisser le presse-étoupe (s'assurer du bon remontage de celui-ci afin de garantir une bonne étanchéité).

REGLAGE DES CONTACTS FINS DE COURSE

L'actionneur est préréglé en usine. Ne pas toucher les 2 cames inférieures sous peine de perturber le fonctionnement de l'actionneur voire d'endommager ce dernier.

- Pour ajuster la position des contacts auxiliaires, faire pivoter les 2 cames supérieures en utilisant la clé appropriée.
- Remonter le capot, visser les 4 vis et monter l'indicateur visuel.

RESPECT SAFETY INSTRUCTIONS

Our cable glands are designed for cables with a diameter between 7mm and 12mm.

- Remove the position indicator, unscrew the four screws and take off the cover.

SUPPLY AND CONTROL WIRING

- Ensure that the voltage indicated on the actuator ID label corresponds to the voltage supply.
- Connect the wires to the connector in accordance with the required control mode.

WIRING OF THE FEEDBACK SIGNAL

Our actuators are equipped with two simple limit switch contacts normally set either in open position, either in closed position (see wiring diagram DSBA0436). As per factory setting, the white cam is used to detect the open position (FC1) and the black cam is used to detect the closed position (FC2).
The auxiliary limit switches must be connect with rigid wires. If the applied voltage is higher than 42V, the user must foresee a fuse in the power supply line.

- Unscrew the right cable gland and insert the cable.
- Remove 25mm of the cable sheath and strip each wire by 8mm.
- Connect the wires to the terminal strip in accordance with the diagram 13
- Tighten the cable gland (Ensure that it's well mounted to guaranty the proofness).

SETTING OF END LIMIT SWITCHES

The actuator is pre-set in our factory. Do not touch the two lower cams in order to avoid any malfunctioning or even damage to the actuator.

- To adjust the position of the auxiliary contacts, make rotate the two superior cams by using the appropriate wrench.
- Re-mount the cover, fasten the four screws and attach the position indicator.

ELECTRIC WIRING EN
SCHALTPLAN D
ESQUEMA ELÉCTRICO ES
SCHÉMA ÉLECTRIQUE

La température du bornier peut atteindre 90°C
The terminal temperature can reach 90°C
Die Terminal-Temperatur kann bis zu 90°C erreichen.
N.B. : Les câbles utilisés doivent être rigides (tensions pour la recopie : 4 à 250V AC/DC)
N.B.: The used wires must be rigid (feedback voltages : 4 to 250V AC/DC)
N.B.: Die Anschlusskabel müssen biegesteif sein (Rückmeldespannungen 4 bis 250V AC/DC)

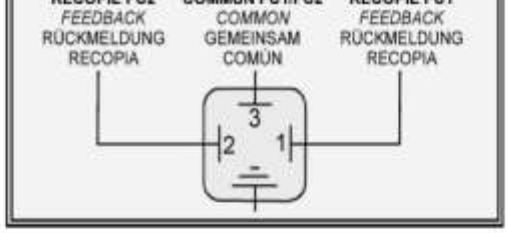
REP	**DESIGNATION** / BESCHREIBUNG / DESIGNACIÓN
FC0	**Fin de course ouverture** / *Open limit switch* / Endschalter AUF / Final de carrera apertura
FCF	**Fin de course fermeture** / *Close limit switch* / Endschalter ZU / Final de carrera cierre
FC1	**Fin de course auxiliaire 1** / *Auxiliary limit switch 1* / Zusätzlicher Endschalter 1 / Final de carrera auxiliar 1
FC2	**Fin de course auxiliaire 2** / *Auxiliary limit switch 2* / Zusätzlicher Endschalter 2 / Final de carrera auxiliar 2
M	**Moteur** / *Motor*

ALIMENTATION : CONNECTEUR 3P+T DIN43650
POWER SUPPLY : 3P+T DIN43650 CONNECTOR
SPANNUNGSVERSORGUNG : 3P+T DIN43650 VERBINDUNG

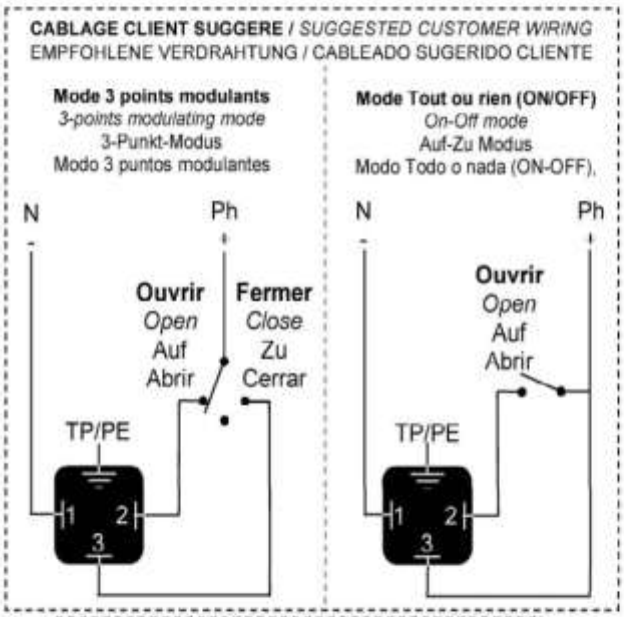
RECOPIE / *FEEDBACK* / RÜCKMELDUNG / RECOPIA

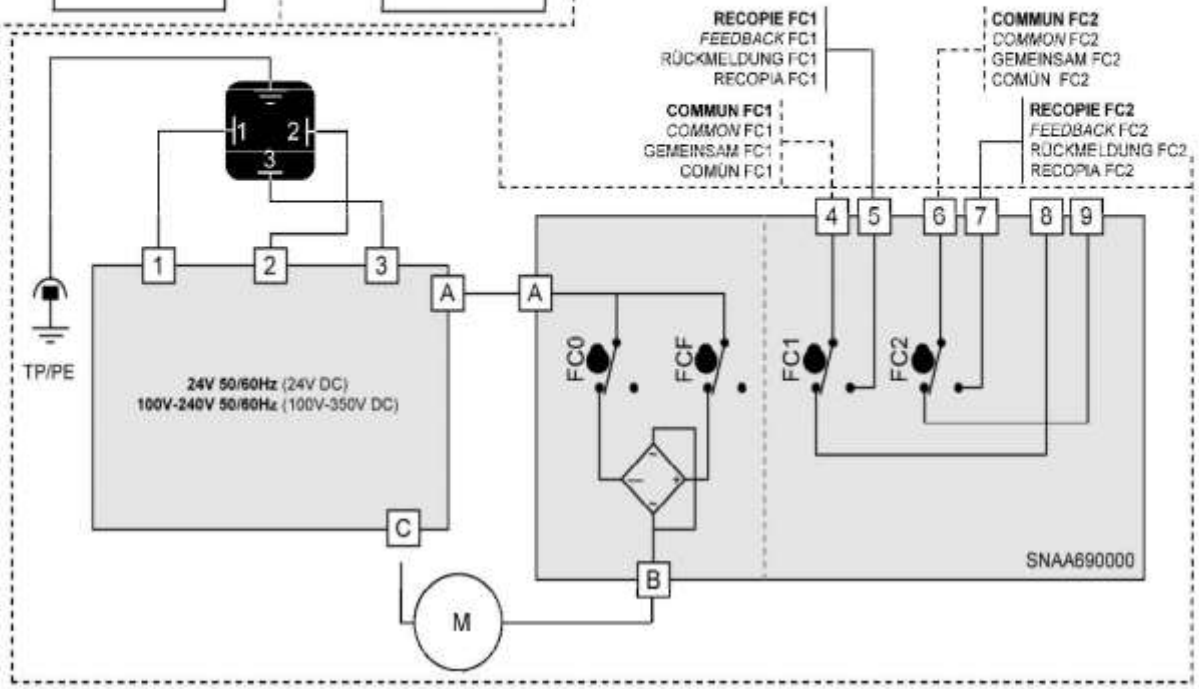
SI OPTION CONNECTEUR (ECD.1A)
IF CONNECTAR OPTION (ECD.1A)
BEI OPTIONALEM STECKER (ECD.1A)
SI OPTIÓN CONNECTADOR (ECD.1A)

ECD.1A
Connecteur gris / grey connector
grau Verbindung / conectador gris



CABLAGE CLIENT SUGGERE / *SUGGESTED CUSTOMER WIRING*
EMPFOHLENE VERDRAHTUNG / CABLEADO SUGERIDO CLIENTE



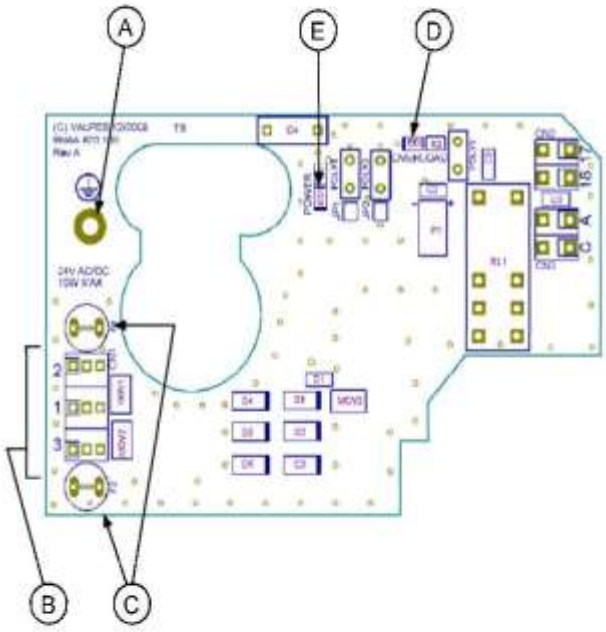


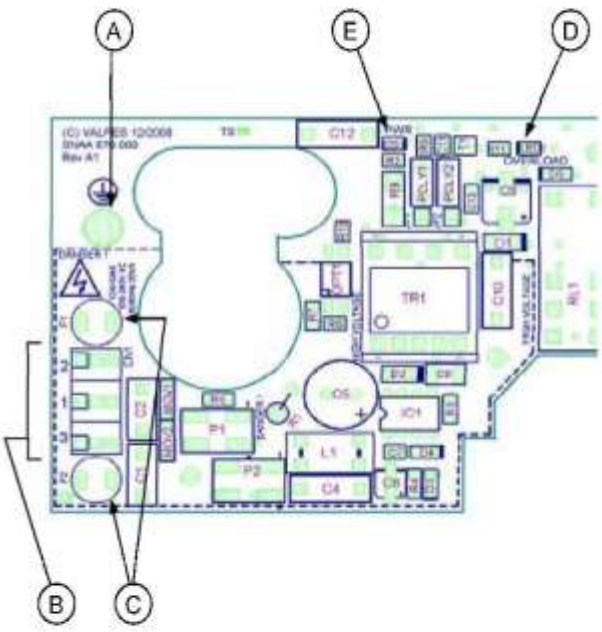
CARTES ÉLECTRONIQUES

EN **ELECTRONIC CARDS**
D **ELEKTRONISCHE KARTEN**
ES **TARJETAS ELECTRÓNICAS**

Cartes d'alimentation et commande pour ER 20-35 / *Pilot and power supply cards for ER 10-20-35*
Steuerung und Stromversorgung Karten fur ER 10-20-35 / Tarjetas de alimentación y mando para ER 10-20-35

SNAA670100 **24V 50/60Hz (24V DC)**	**SNAA670000** **100V-240V 50/60Hz (100V-350V DC)**





Rep.	Désignation	*Designation*	Bezeichnung	Designación
A	**Vis de terre**	*Earth screw*	Erde Schraube	Tornillo de tierra
B	**Bornier alimentation et commande**	*Pilot and power supply terminal strip*	Steuerung und Stromversorgung Verbindung	Terminal de alimentación y mando
C*	**Fusibles protection carte**	*Card protection fuses*	Karte Sicherung	Fusibles de protección de la tarjeta
D**	**LED 2 : défaut détecté**	*LED 2 : detected failure*	LED 2 : Aufgespürter Fehler	Diodo 2 : Defecto detectado
E	**LED 1 : présence tension**	*LED 1 : power presence*	LED 1 : Spannungsanwesenheit	Diodo 1 : Presencia de tensión

* **Fusibles pour carte multi-tensions** / *Fuses for multivolt card* / Sicherung fur Multispannung Karte :
- **Carte** / *Card* / Karte **SNAA670100** : Fuse 1A / T (Schurter 0034.6615)
- **Carte** / *Card* / Karte **SNAA670000** : Fuse 500mA / T (Schurter 0034.6612)

** **Défauts possibles : limitation de courant, limitation thermique ou erreur programme**
=> vérifier que le couple de la vanne n'est pas supérieur au couple maximum fourni par l'actionneur
=> vérifier que l'actionneur ne dépasse pas la durée sous tension donnée (surchauffe possible)
Pour redémarrer l'actionneur, inverser le sens de marche ou l'éteindre et le remettre sous tension.

Possible defects : limitation of current, thermic limitation or program error
=> check that the valve torque is not superior to the maximum torque stand by the actuator
=> check that the actuator do not exceed the duty cycle indicated (possible overheat)
To re-start the actuator, reverse the sense of rotation or switch the power off and on.

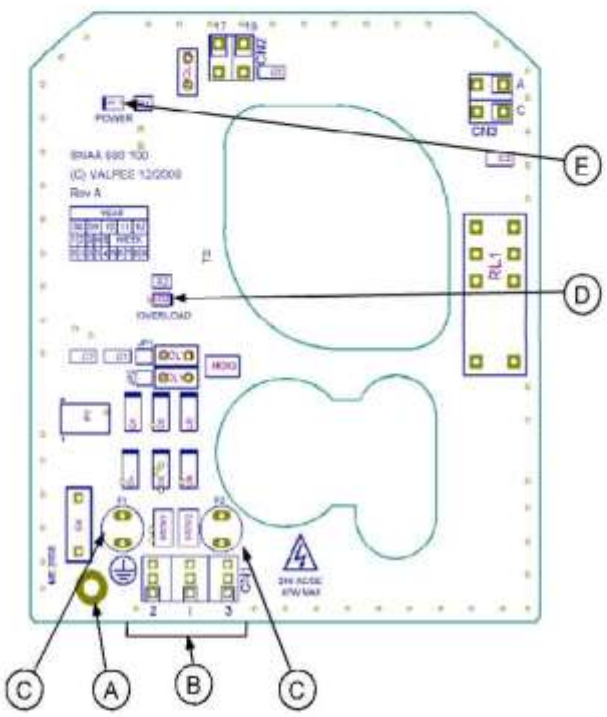
Mögliche Fehler : Strombegrenzung, thermische Begrenzung oder Programmsfehler
=> Überprüfen sie das Drehmoment von dem Ventil
=> Überprüfen sie das die Einschaltdauer nicht grober als spezifisiert in die technischen Daten von den Antrieb ist
Um die Antrieb neue zu starten, muss man den Drehrichtung auswechseln oder die Spannung Auf/Zu Umschalten.

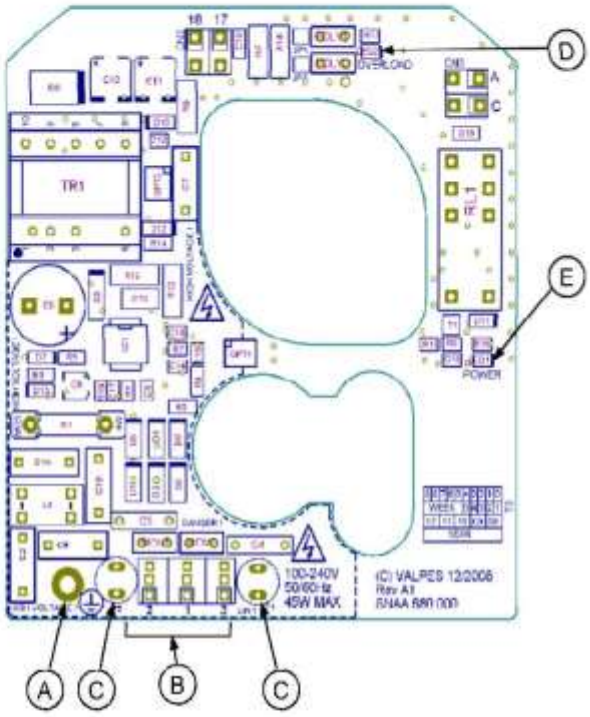
Defectos posibles : limitación de corriente, limitación térmica o error del programa
=> comprobar que el par de la valvula no es superior al par máxima soportado por el actuador
=> comprobar que el actuador no adelanta el tiempo bajo tensión dado (recalentamiento posible)
Para arrancar de nuevo el actuador, invertir la dirección del functionamiento o apagarlo y ponerlo bajo tensión.

CARTES ÉLECTRONIQUES

Cartes d'alimentation et commande pour ER 35-60-100 / *Pilot and power supply cards for ER 35-60-100*
Steuerung und Stromversorgung Karten fur ER 35-60-100 / Tarjetas de alimentación y mando para ER 35-60-100

SNAA680100 24V 50/60Hz (24V DC)	SNAA680000 100V-240V 50/60Hz (100V-350V DC)





Rep.	Désignation	*Designation*	Bezeichnung	Designación
A	**Vis de terre**	*Earth screw*	Erde Schraube	Tornillo de tierra
B	**Bornier alimentation et commande**	*Pilot and power supply terminal strip*	Steuerung und Stromversorgung Verbindung	Terminal de alimentación y mando
C*	**Fusibles protection carte**	*Card protection fuses*	Karte Sicherung	Fusibles de protección de la tarjeta
D**	**LED 2 : défaut détecté**	*LED 2 : detected failure*	LED 2 : Aufgespürter Fehler	Diodo 2 : Defecto detectado
E	**LED 1 : présence tension**	*LED 1 : power presence*	LED 1 : Spannungsanwesenheit	Diodo 1 : Presencia de tensión

* **Fusibles pour carte multi-tensions** / *Fuses for multivolt card* / Sicherung für Multispannung Karte :
- **Carte** / *Card* / Karte **SNAA730100** : 3.15A / T (Schurter 0034.6620)
- **Carte** / *Card* / Karte **SNAA730000** : 1A / **T** (Schurter 0034.6615)

** **Défauts possibles : limitation de courant, limitation thermique ou erreur programme**
=> vérifier que le couple de la vanne n'est pas supérieur au couple maximum fourni par l'actionneur
=> vérifier que l'actionneur ne dépasse pas la durée sous tension donnée (surchauffe possible)
Pour redémarrer l'actionneur, inverser le sens de marche ou l'éteindre et le remettre sous tension.

Possible defects : limitation of current, thermic limitation or program error
=> check that the valve torque is not superior to the maximum torque stand by the actuator
=> check that the actuator do not exceed the duty cycle indicated (possible overheat)
To re-start the actuator, reverse the sense of rotation or switch the power off and on.

Mögliche Fehler : Strombegrenzung, thermische Begrenzung oder Programmsfehler
=> Überprüfen sie das Drehmoment von dem Ventil
=> Überprüfen sie das die Einschaltdauer nicht grober als spezifisiert in die technischen Daten von den Antrieb ist
Um die Antrieb neue zu starten, muss man den Drehrichtung auswechseln oder die Spannung Auf/Zu Umschalten.

Defectos posibles : limitación de corriente, limitación térmica o error del programa
=> comprobar que el par de la valvula no es superior al par máxima soportado por el actuador
=> comprobar que el actuador no adelanta el tiempo bajo tensión dado (recalentamiento posible)
Para arrancar de nuevo el actuador, invertir la dirección del functionamiento o apagarlo y ponerlo bajo tensión.

DONNÉES TECHNIQUES

EN **TECHNICAL DATAS**

DONNEES TECHNIQUES / *TECHNICAL DATA*				
Type (actionneur électrique 1/4 tour) / Type (1/4 turn electric actuator)	ER20	ER35	ER60	ER100
Protection IP / *IP protection (EN60529)*	IP65 (étanche aux poussières, jet d'eaux « débit <12.5 L/min » / *dusttight, water spraying « flow <12.5 L/min »)*			
Résistance à la corrosion (utilisation en intérieur et extérieur) *Corrosion resistance (outdoor and indoor use)*	Plastique / *plastic* : PA6.6 FV 30% et / and Nylon UL94V0 Toutes pièces métalliques :INOX 304L ou Acier + traitement Zn *Raw material : 304L Stainless Steel or Steel + Zn treatment*			
Température / *Temperature*	-10°C à/*to* +55°C			
Hydrométrie / *Hydrometry*	< 81% à 31°C (88°F) avec décroissance linéaire jusqu'à 50% à 40°C(selon EN61010-1) < 81% to 31°C (88°F) with lineary decrease down to 50% at 40°C (according EN61010-1)			
Degré de pollution / *Pollution degree*	Classe 2 / *Class 2*			
Altitude / *Altitude*	0 à/*to 2000m*			
Poids / *Weight*	1 Kg	2.1 Kg		
DONNEES MECANIQUES / *MECHANICAL DATA*				
Couple nominal / *Nominal torque*	20Nm	35Nm	60Nm	100Nm
Temps de manœuvre *1/4 operating time* (± 10%)	10s	10s	15s	24s
Embase de fixation *Mounting actuator base (ISO5211)*	Etoile/*Star 14* *F03-F04-F05*	Etoile/*Star 22* *F05-F07*	Etoile/*Star 22* *F05-F07*	Etoile/*Star 22* *F05-F07*
Angle de rotation / *Rotation angle*	90° (autres sur demande / *others on request)*			
Butées mécaniques / *Mechanical end stops*	90° +/- 5°			
Commande manuelle / *Manual override*	Axe sortant / *Out axle*			
Sens de rotation / *Direction of rotation*	Sens antihoraire pour ouvrir / *Anticlockwise to open*			
DONNEES ELECTRIQUES / *ELECTRICAL DATA*				
Tension / *Voltage* (± 10%)	24V AC/DC ou/*or 100V à/to 240V AC (100V à/to 350V DC)*			
Fréquence / *Frequency*	50/60Hz			
Puissance / *Power*	15W (0.08A) cos φ = 0.75	45W (0.15A) cos φ = 0.75		
Catégorie surtension / *Overvoltage category*	Catégorie II / *Category II*			
Limiteur de couple / *Torque limiter*	Électrique / *electric*			
Durée sous tension / *Duty rating (CEI34)*	30%			
Tension maximale contacts fins de course / *Limit switches maximal voltage*	4V à/to 250V AC/DC (Surtension catégorie II / Overvoltage category II)			
Courant maximal contacts fins de course / *Limit switches maximal current*	10mA à/to 5A max			
Raccordement électrique / *Electrical wiring*	1 Presse étoupe ISO M20 / *1 ISO M20 gland* *1 connecteur 3P+T DIN43650 / 1 DIN43650 3P+T connector*			
Courrant de démarrage *Inrush current*	Disjoncteur courbe D, courant nominal en fonction du nombre d'actionneurs Circuit breaker D curve, nominal current according the number of actuators			

SECTION NO. 8.

BELINO ACTUATED - MODULATING DAMPER.

BELIMO

Technical data sheet NMQ24A-SR

Modulating damper actuator for adjusting dampers in technical building installations

- **Air damper size up to approx. 1.5 m²**
- **Torque motor 8 Nm**
- **Nominal voltage AC/DC 24 V**
- **Control modulating 2...10 V**
- **Position feedback 2...10 V**
- **Running time motor 4 s**

Technical data

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	13 W
	Power consumption in rest position	2 W
	Power consumption for wire sizing	23 VA
	Power consumption for wire sizing note	Imax 20 A @ 5 ms
	Connection supply / control	Cable 1 m, 4 x 0.75 mm²
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	8 Nm
	Operating range Y	2...10 V
	Input Impedance	100 kΩ
	Position feedback U	2...10 V
	Position feedback U note	Max. 0.5 mA
	Position accuracy	±5%
	Direction of motion motor	selectable with switch 0/1
	Direction of motion note	Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation)
	Manual override	with push-button, can be locked
	Angle of rotation	Max. 95°
	Angle of rotation note	can be limited on both sides with adjustable mechanical end stops
	Minimum angle of rotation	Min. 30°
	Running time motor	4 s / 90°
	Adaptation setting range	manual (automatic on first power-up)
	Sound power level, motor	56 dB(A)
	Mechanical interface	Universal shaft clamp reversible 8...26.7 mm
	Position indication	Mechanically, pluggable
Safety	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Enclosure	UL Enclosure Type 2
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Certification UL	cULus according to UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1:02
	Certification UL note	The UL marking on the actuator depends on the production site, the device is UL-compliant in any case
	Mode of operation	Type 1
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...40°C
	Ambient temperature note	Caution: +40...+50°C utilisation possible only under certain restrictions. Please contact your supplier.
	Storage temperature	-40...80°C
	Ambient humidity	Max. 95% r.H., non-condensing

Technical data

Safety	Servicing	maintenance-free
Weight	Weight	1.8 kg

Safety notes

- The device must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- Outdoor application: only possible in case that no (sea) water, snow, ice, insolation or aggressive gases interfere directly with the actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- Cables must not be removed from the device.
- Self adaption is necessary when the system is commissioned and after each adjustment of the angle of rotation (press the adaption push-button once).
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation site and the ventilation conditions must be observed.
- The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

Mode of operation
The actuator is connected with a standard modulating signal of 0...10 V and drives to the position defined by the positioning signal. Measuring voltage U serves for the electrical display of the damper position 0.5...100% and as slave control signal for other actuators.

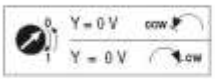
Simple direct mounting
Simple direct mounting on the damper shaft with a universal shaft clamp, supplied with an anti-rotation device to prevent the actuator from rotating.

Manual override
Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).

Adjustable angle of rotation
Adjustable angle of rotation with mechanical end stops. A minimum permissible angle of rotation of 30° must be allowed for.

High functional reliability
The actuator is overload protected, requires no limit switches in intermediate positions and automatically stops when the end stop is reached (at rest).

Home position
The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range.
The detection of the mechanical end stops enables a gentle approach to the end positions, thus protecting the actuator mechanics.
The actuator then moves into the position defined by the positioning signal.



Adaption and synchronisation
An adaption can be triggered manually by pressing the "Adaption" button. Both mechanical end stops are detected during the adaption (entire setting range).
Automatic synchronisation after pressing the gear disengagement button is configured.
The synchronisation is in the home position (0%).
The actuator then moves into the position defined by the positioning signal.

Accessories

	Description	Type
Electrical accessories	Auxiliary switch 1 x SPDT add-on	S1A
	Auxiliary switch 2 x SPDT add-on	S2A
	Auxiliary switch 2 x SPDT add-on, grau	S2A/300 GR
	Auxiliary switch 2 x SPDT add-on, grau	S2A/500 GR
	Feedback potentiometer 140 Ω add-on	P140A
	Feedback potentiometer 140 Ω add-on, grau	P140A GR
	Feedback potentiometer 200 Ω add-on	P200A
	Feedback potentiometer 500 Ω add-on	P500A
	Feedback potentiometer 500 Ω add-on, grau	P500A GR
	Feedback potentiometer 1 kΩ add-on	P1000A
	Feedback potentiometer 1 kΩ add-on, grau	P1000A GR
	Feedback potentiometer 2.8 kΩ add-on	P2800A
	Feedback potentiometer 2.8 kΩ add-on, grau	P2800A GR
	Feedback potentiometer 5 kΩ add-on	P5000A
	Feedback potentiometer 5 kΩ add-on, grau	P5000A GR
	Feedback potentiometer 10 kΩ add-on	P10000A
	Feedback potentiometer 10 kΩ add-on, grau	P10000A GR
	Adapter for auxiliary switch and feedback potentiometer	Z-SPA
	Signal converter voltage/current 100 kΩ Supply AC/DC 24 V	Z-UIC
	Range controller for wall mounting	SBG24
	Positioner for wall mounting	SGA24
	Positioner for built-in mounting	SGE24
	Positioner for front-panel mounting	SGF24
	Positioner for wall mounting	CRP24-B1

	Description	Type
Mechanical accessories	Shaft extension 240 mm Ø20 mm for damper shaft Ø 12...21 mm CrNi	AV12-25-I
	Shaft extension 240 mm Ø20 mm for damper shaft Ø 8...22.7 mm	AV8-25
	Ball joint suitable for damper crank arm KH8	KG8
	Ball joint suitable for damper crank arm KH8 / KH10	KG10A
	Damper crank arm Slot width 8.2 mm, clamping range Ø10...18 mm	KH8
	Shaft clamp one-sided, clamping range Ø8...26 mm, Multipack 20 pcs.	K-ENSA
	Shaft clamp one-sided, clamping range Ø12...26 mm, for CrNi shaft (INOX), Multipack 20 pcs.	K-ENSA-I
	Shaft clamp reversible, clamping range Ø10...20 mm	K-SA
	Anti-rotation mechanism 180 mm, Multipack 20 pcs.	Z-ARS180
	Anti-rotation mechanism 230 mm, Multipack 20 pcs.	Z-ARS230
	Form fit insert 10x10 mm, Multipack 20 pcs.	ZF10-NSA
	Form fit insert 12x12 mm, Multipack 20 pcs.	ZF12-NSA
	Form fit insert 15x15 mm, Multipack 20 pcs.	ZF15-NSA
	Form fit insert 16x16 mm, Multipack 20 pcs.	ZF16-NSA
	Mounting kit for linkage operation for flat installation	ZG-SMA
	Position indicator, Multipack 20 pcs.	Z-PI
	Base plate extension for SM..A to SM../AM../SMD24R, Multipack 20 pcs.	Z-SMA

* Adapter Z-SPA
It is imperative that this adapter will be ordered if an auxiliary switch or a feedback potentiometer is required and if at the same time the shaft clamp is installed on the rear side of the actuator (e.g. with short-axis installation).

Electrical installation

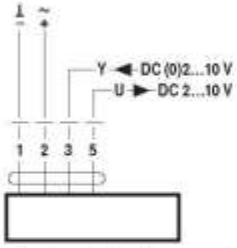
Notes

- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.

Electrical installation

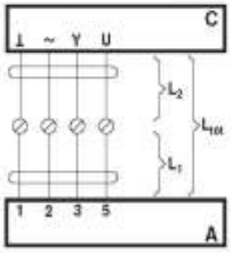
Wiring diagrams

AC/DC 24 V, modulating



Cable colours:
1 = black
2 = red
3 = white
5 = orange

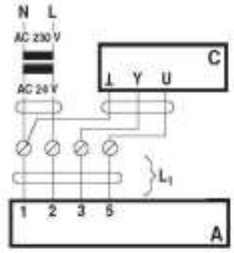
Signal cable lengths



L_2	$L_{tot} = L_1 + L_2$	
⊥ / ~	AC	DC
0.75 mm²	≤30 m	≤5 m
1.00 mm²	≤40 m	≤8 m
1.50 mm²	≤70 m	≤12 m
2.50 mm²	≤100 m	≤20 m

A = Actuator
C = Control unit (controlling unit)
L1 = Connecting cable of the actuator
L2 = Customer cable
Ltot = Maximum signal cable length

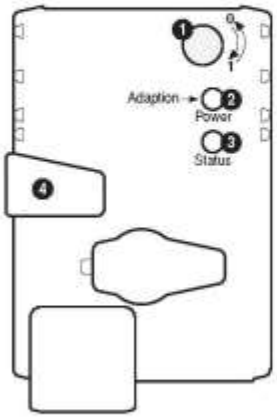
Note:
When several actuators are connected in parallel, the maximum signal cable length must be divided by the number of actuators.



A = Actuator
C = Control unit (controlling unit)
L1 = Connecting cable of the actuator

Note:
There are no special restrictions on installation if the supply and the data cable are routed separately.

Operating controls and indicators



1 Direction of rotation switch
Switch over: Direction of rotation changes

2 Push-button and LED display green
Off: No power supply or malfuntion
On: In operation
Press button: Triggers angle of rotation adaptation, followed by standard mode

3 Push-button and LED display yellow
Off: Standard mode
On: Adaptation or synchronising process active
Press button: No function

4 Gear disengagement button
Press button: Gear disengages, motor stops, manual override possible
Release button: Gear engages, synchronisation starts, followed by standard mode

Check power supply connection
2 Off and 3 On: Possible wiring error in power supply

Installation notes

Negative torque Max. 50% of the torque (Caution: Application possible only with restrictions. Please contact your supplier.)

Dimensions [mm]

Spindle length

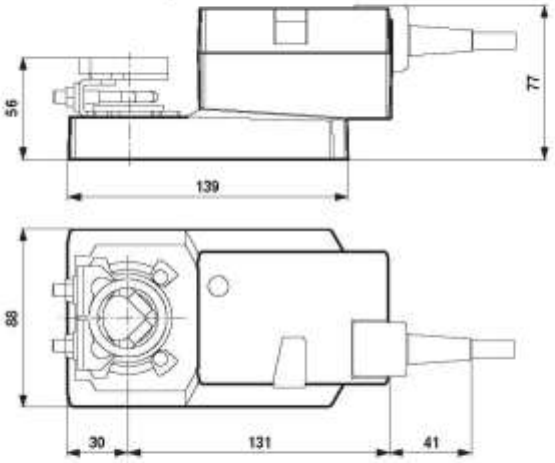
	Min. 42
	Min. 20

Clamping range

	○	□	◇
	8...26.7	≥8	≤26.7
*	8...20	≥8	≤20

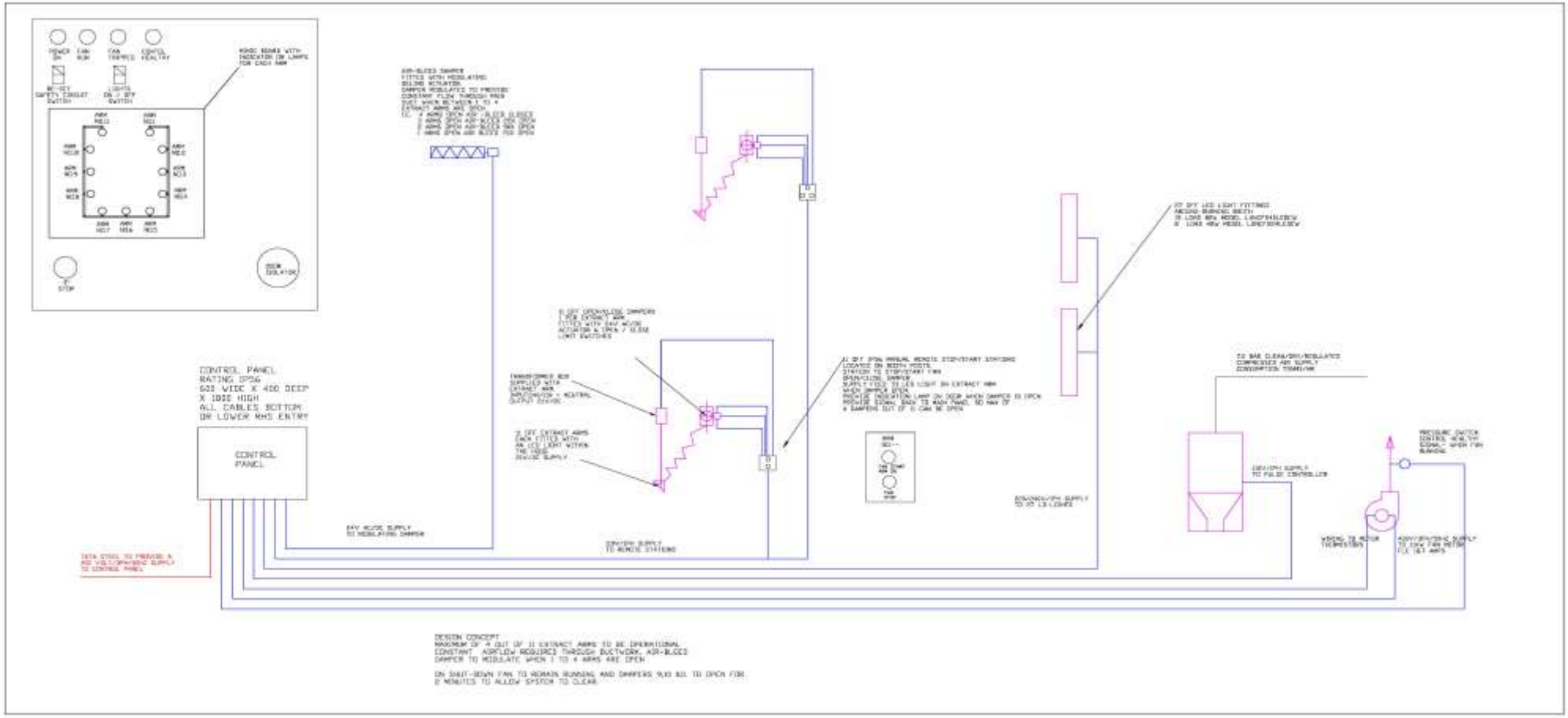
*Option: Shaft clamp mounted below (accessory K-SA needed)
*Option: Shaft clamp mounted below: If an auxiliary switch or a feedback potentiometer is used the adapter Z-SPA is required.

Dimensional drawings



SECTION NO. 9.

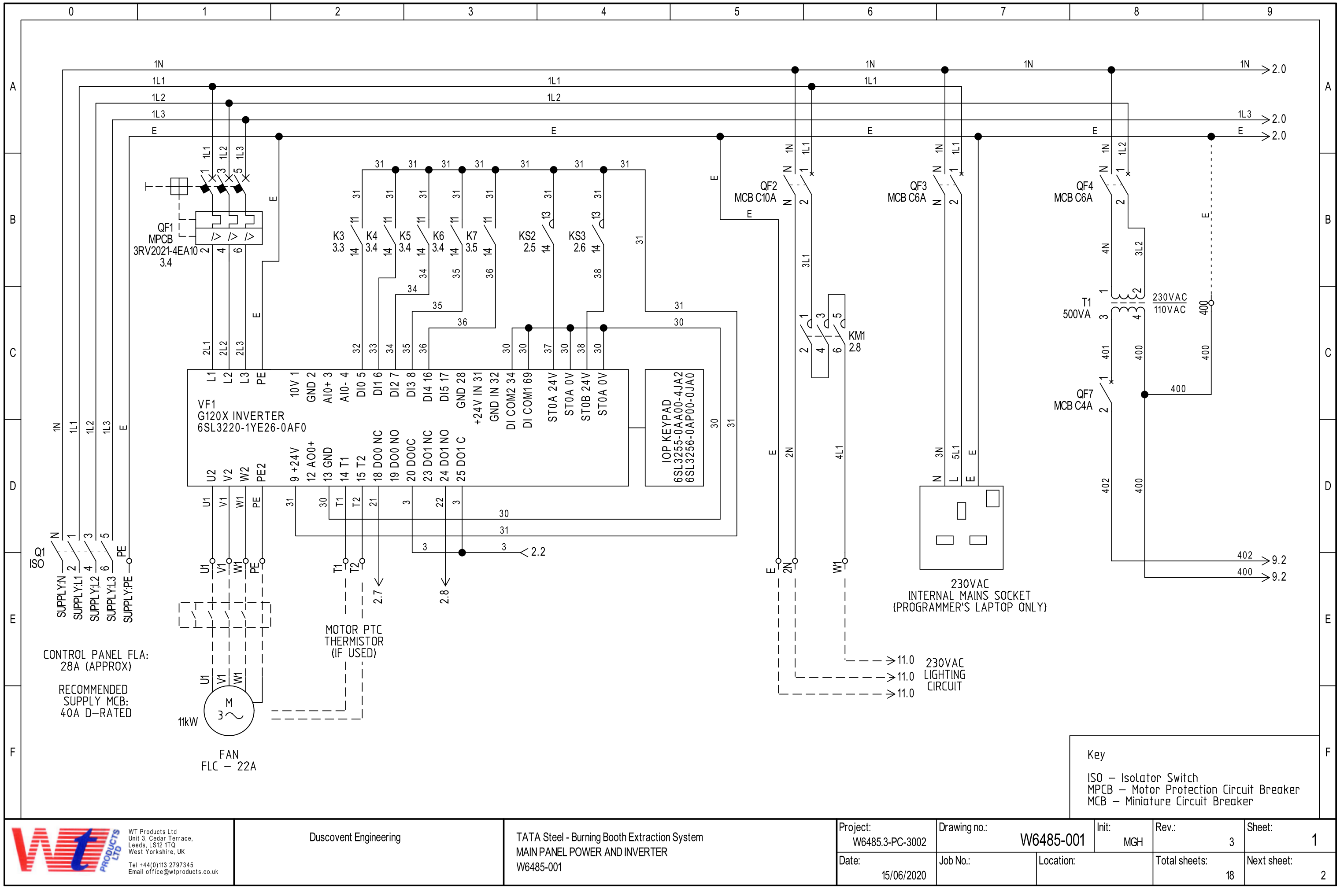
ELECTRICAL INFORMATION.


CONTROL PANEL
RATING IP56
600 WIDE X 400 DEEP
X 1800 HIGH
ALL CABLES BOTTOM
OR LOWER RHS ENTRY
CONTROL PANEL
DESIGN CONCEPT
MAXIMUM OF 4 OUT OF 11 EXTRACT ARMS TO BE OPERATIONAL
CONSTANT AIRFLOW REQUIRED THROUGH DUCTWORK, AIR-BLOCK
DAMPER TO MODULATE WHEN 1 TO 4 ARMS ARE OPEN
ON SHUT-DOWN FAN TO REMAIN RUNNING AND DAMPERS 9,10 &11 TO OPEN FOR
2 MINUTES TO ALLOW SYSTEM TO CLEAR.

Design Concept.

Maximum of 4 out of 11 extract arms to be operational, constant airflow required through ductwork, air-bleed damper to modulate when 1 to 4 arms are open.

On shut-down fan to remain running and dampers 9, 10 and 11 to open for 2 minutes to allow system to clear.



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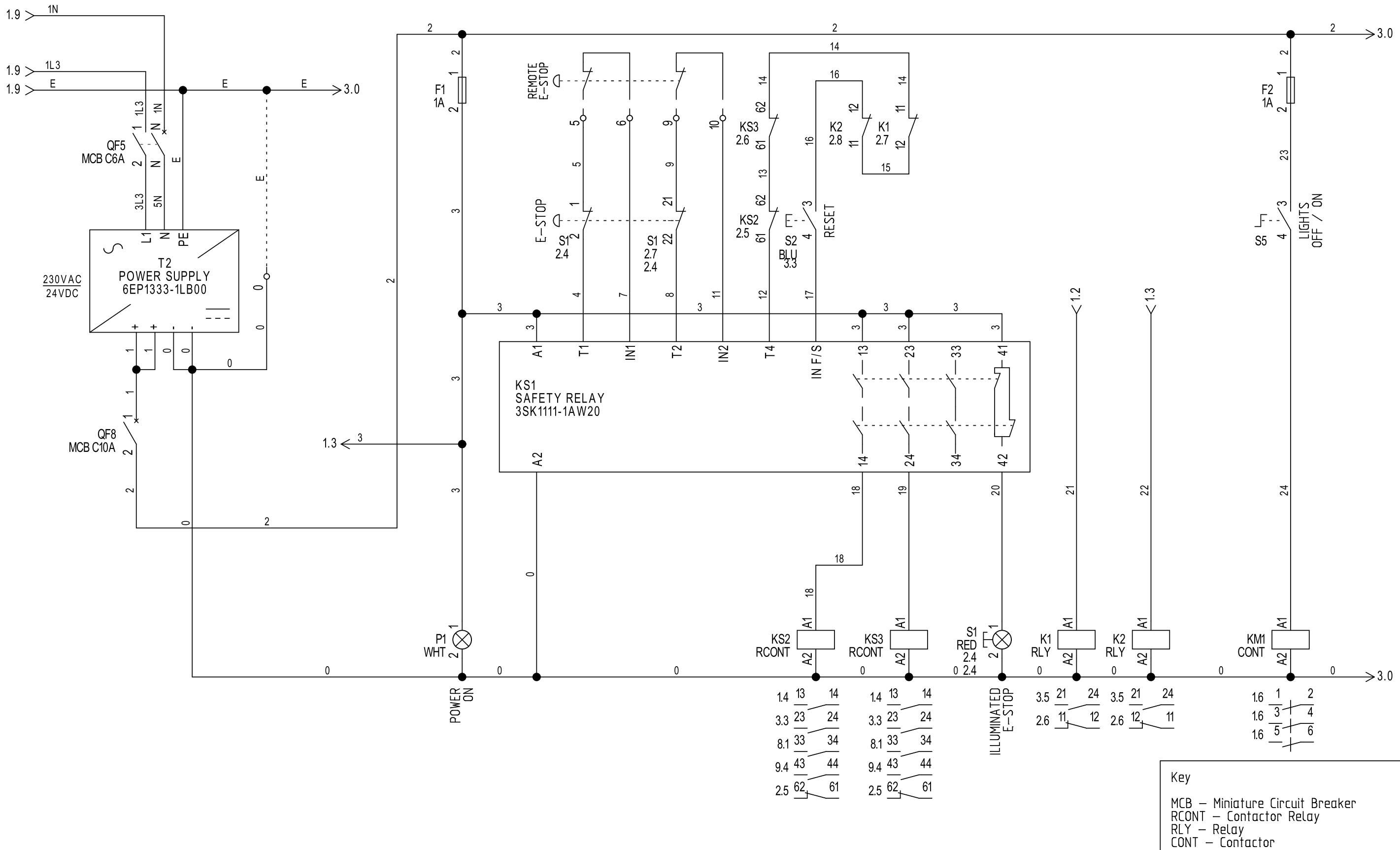
Duscovent Engineering

TATA Steel - Burning Booth Extraction System
MAIN PANEL POWER AND INVERTER
W6485-001

Project:	Drawing no.:	Init:	Rev.:	Sheet:
W6485.3-PC-3002	W6485-001	MGH	3	1
Date:	Job No.:	Location:	Total sheets:	Next sheet:
15/06/2020			18	2



Key

MCB – Miniature Circuit Breaker
RCONT – Contactor Relay
RLY – Relay
CONT – Contactor

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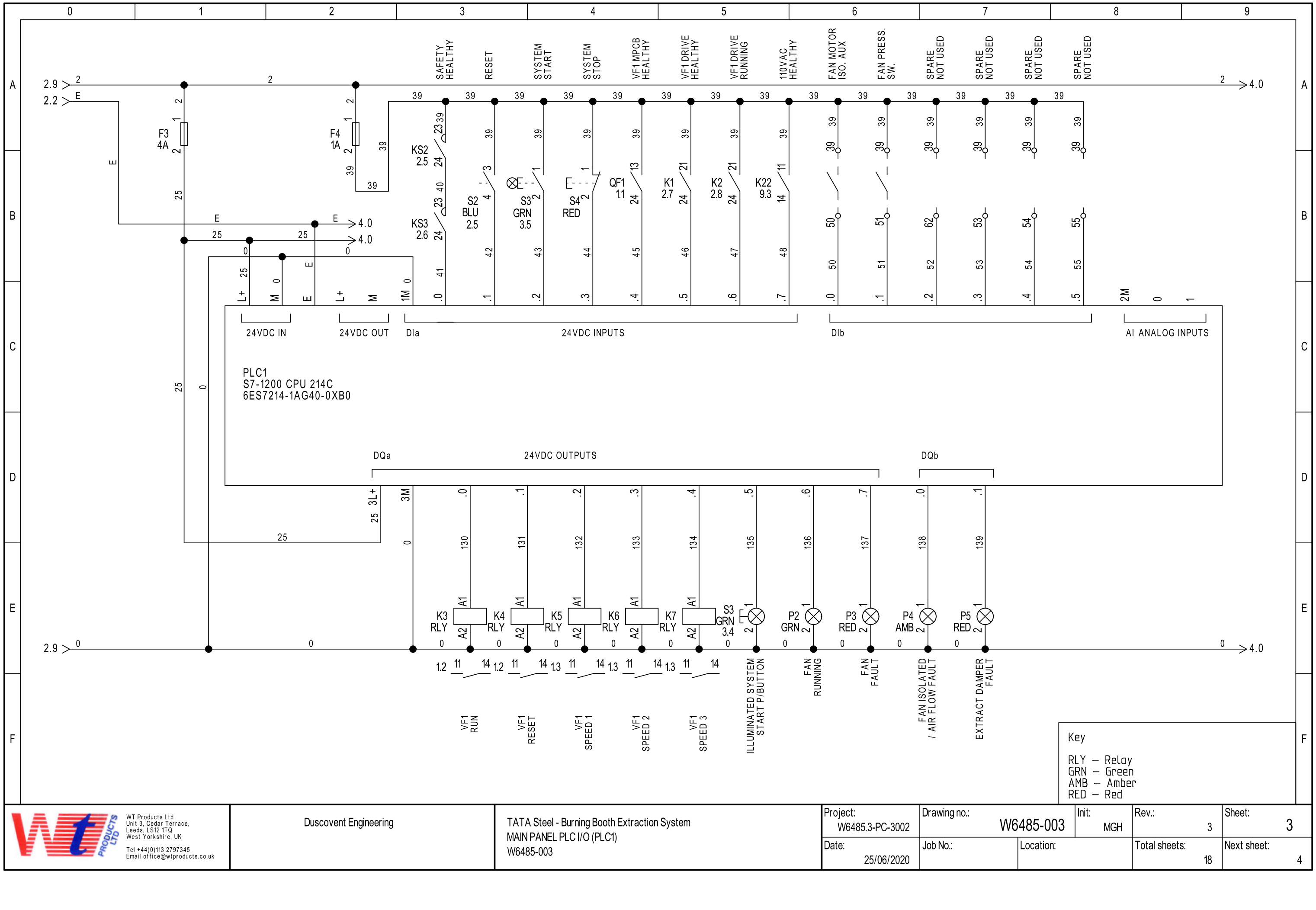
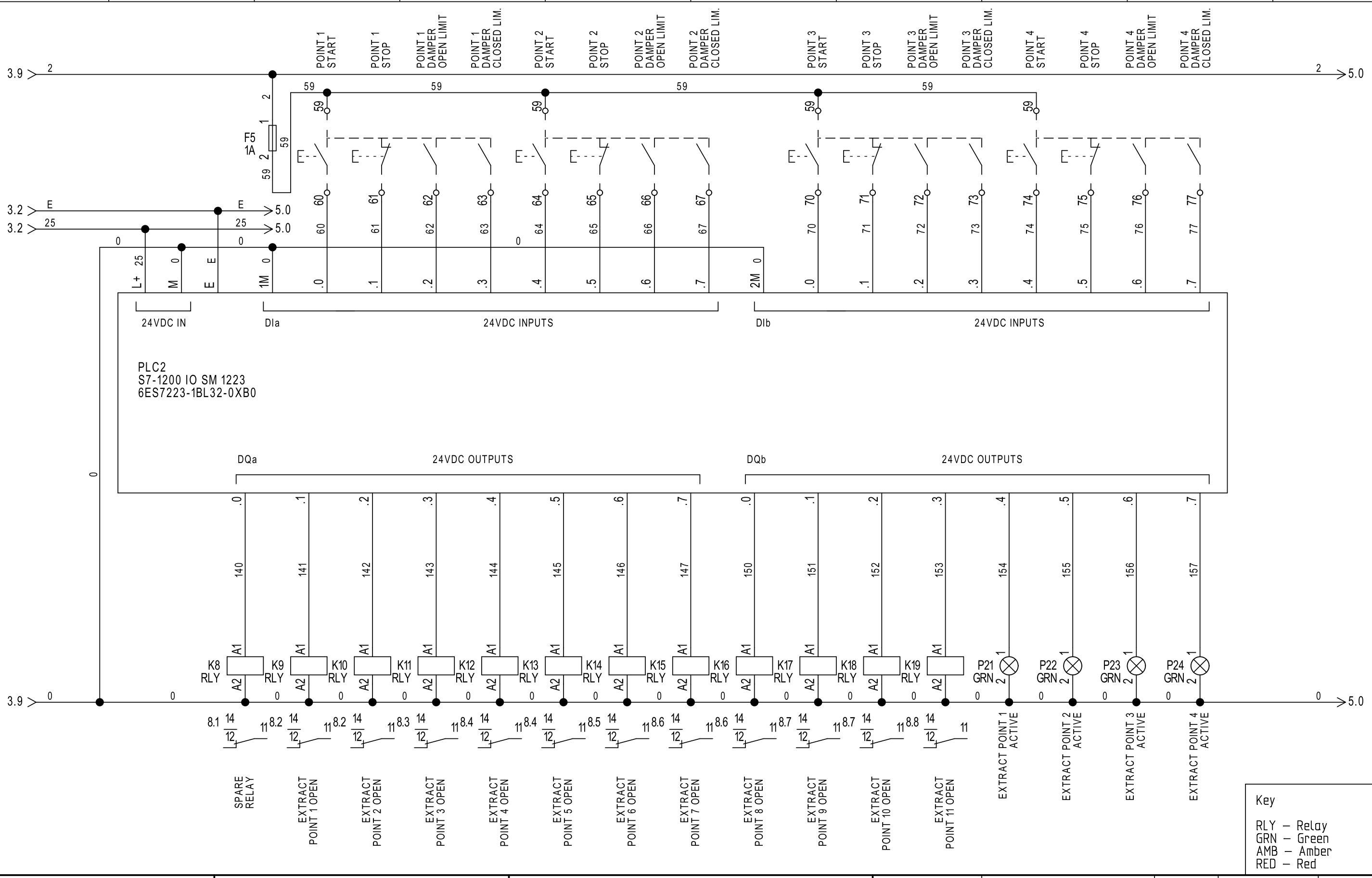
TATA Steel - Burning Booth Extraction System
MAIN PANEL 24VDC CONTROL AND SAFETY RELAY
W6485-002

Project:	Drawing no.:	Init:	Rev.:	Sheet:
W6485.3-PC-3002	W6485-002	MGH	3	2
Date:	Job No.:	Location:	Total sheets:	Next sheet:
15/06/2020			18	3



WT Products Ltd, Unit 3, Cedar Terrace, Leeds, LS12 1TQ, West Yorkshire, UK. Tel +44(0)113 2797345 Email office@wtproducts.co.uk	Duscovent Engineering	TATA Steel - Burning Booth Extraction System MAIN PANEL PLC I/O (PLC1) W6485-003	Project: W6485.3-PC-3002	Drawing no.: W6485-003	Init: MGH
			Date: 25/06/2020	Job No.:	Location:

Rev.:	Sheet:
3	3
Total sheets:	Next sheet:
18	4



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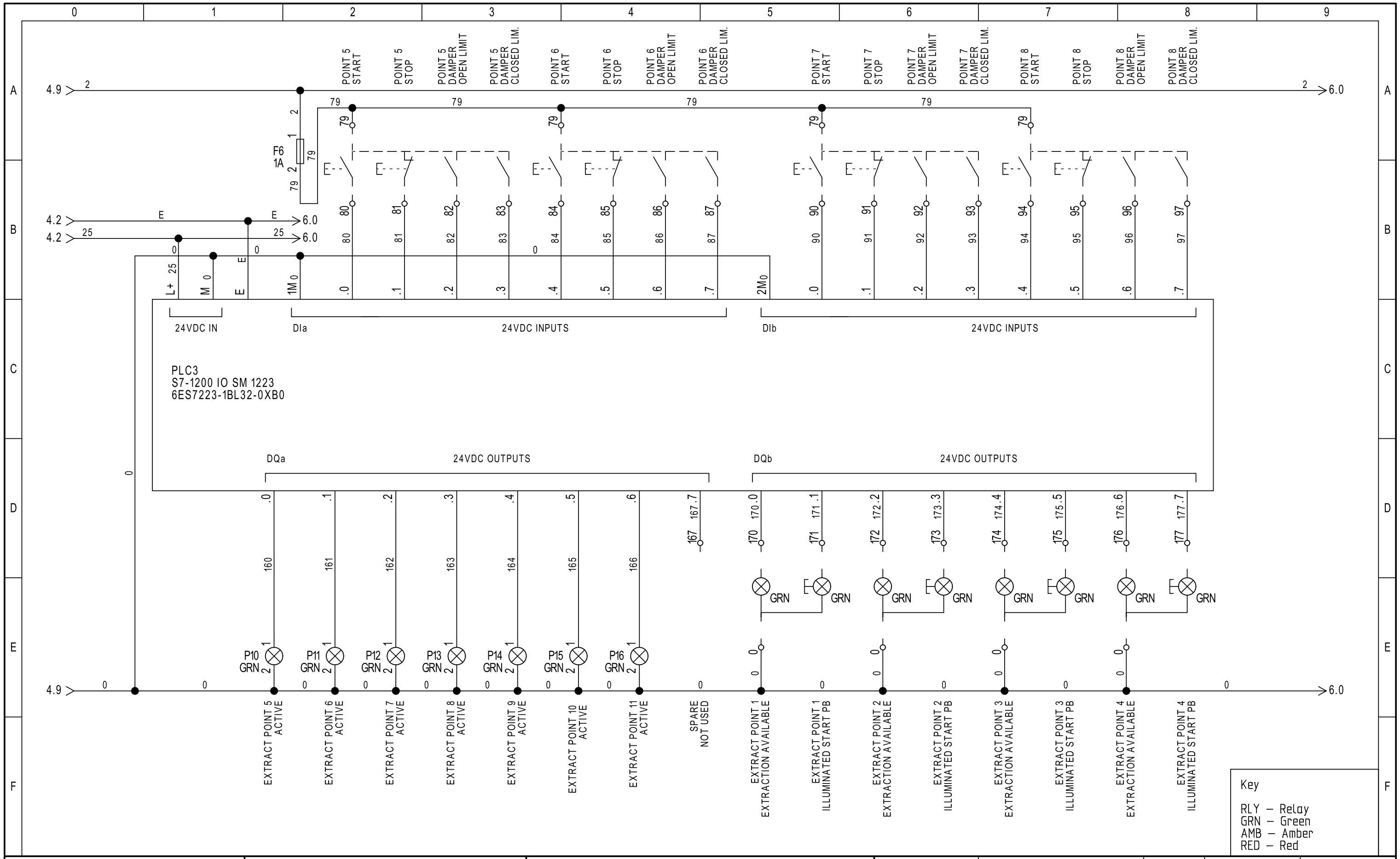
TATA Steel - Burning Booth Extraction System
MAIN PANEL PLC I/O (PLC2)
W6485-004

Project:	Drawing no.:	Init:	Rev.:	Sheet:
W6485.3-PC-3002	W6485-004	MGH	3	4
Date:	Job No.:	Location:	Total sheets:	Next sheet:
25/06/2020			18	5



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TATA Steel - Burning Booth Extraction System
MAIN PANEL PLC I/O (PLC3)
W6485-005

Project: W6485.3-PC-3002	Drawing no.: W6485-005		Init: MGH	Rev.: 3	Sheet: 5
Date: 25/06/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 6

POINT 9 START
POINT 9 STOP
POINT 9 DAMPER OPEN LIMIT
POINT 9 DAMPER CLOSED LIM.
POINT 10 START
POINT 10 STOP
POINT 10 DAMPER OPEN LIMIT
POINT 10 DAMPER CLOSED LIM.
POINT 11 START
POINT 11 STOP
POINT 11 DAMPER OPEN LIMIT
POINT 11 DAMPER CLOSED LIM.
SPARE NOT USED
SPARE NOT USED
SPARE NOT USED
SPARE NOT USED

5.9 2 → 7.0

F7 1A

5.2 E → 7.0
5.2 25 → 7.0

L+ 25
M 0
E
1M 0

24VDC IN

DIa 24VDC INPUTS

DIb 24VDC INPUTS

PLC4
S7-1200 IO SM 1223
6ES7223-1BL32-0XB0

DQa 24VDC OUTPUTS

DQb 24VDC OUTPUTS

GRN

5.9 → 7.0

EXTRACT POINT 5 EXTRACTION AVAILABLE
EXTRACT POINT 5 ILLUMINATED START PB
EXTRACT POINT 6 EXTRACTION AVAILABLE
EXTRACT POINT 6 ILLUMINATED START PB
EXTRACT POINT 7 EXTRACTION AVAILABLE
EXTRACT POINT 7 ILLUMINATED START PB
EXTRACT POINT 8 EXTRACTION AVAILABLE
EXTRACT POINT 8 ILLUMINATED START PB
EXTRACT POINT 9 EXTRACTION AVAILABLE
EXTRACT POINT 9 ILLUMINATED START PB
EXTRACT POINT 10 EXTRACTION AVAILABLE
EXTRACT POINT 10 ILLUMINATED START PB
EXTRACT POINT 11 EXTRACTION AVAILABLE
EXTRACT POINT 11 ILLUMINATED START PB
SPARE NOT USED
SPARE NOT USED

Key

RLY – Relay
GRN – Green
AMB – Amber
RED – Red

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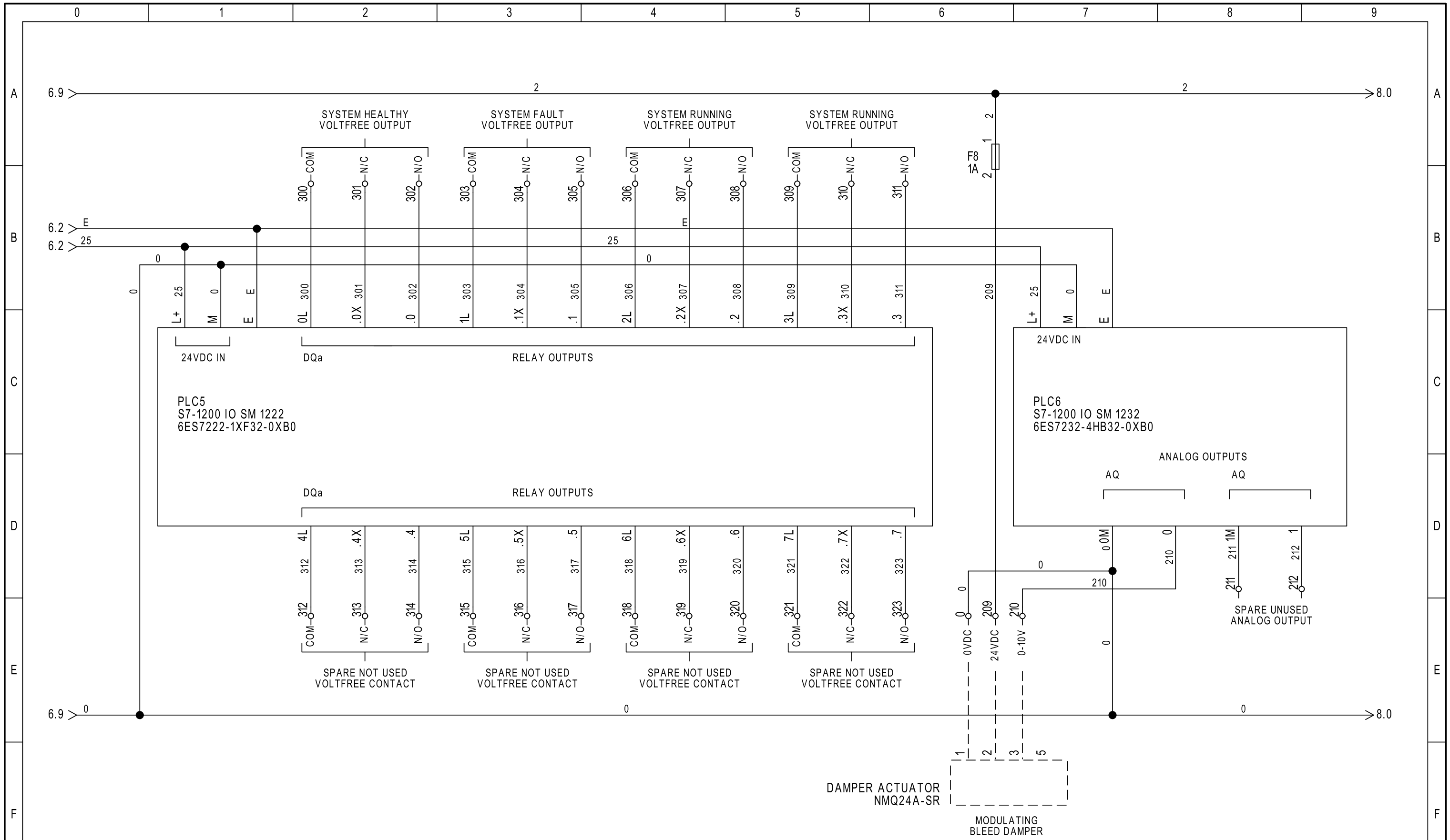
TATA Steel - Burning Booth Extraction System
MAIN PANEL PLC I/O (PLC4)
W6485-006

Project:	Drawing no.:		Init:	Rev.:	Sheet:
W6485.3-PC-3002	W6485-006		MGH	3	6
Date:	Job No.:	Location:		Total sheets:	Next sheet:
25/06/2020				18	7



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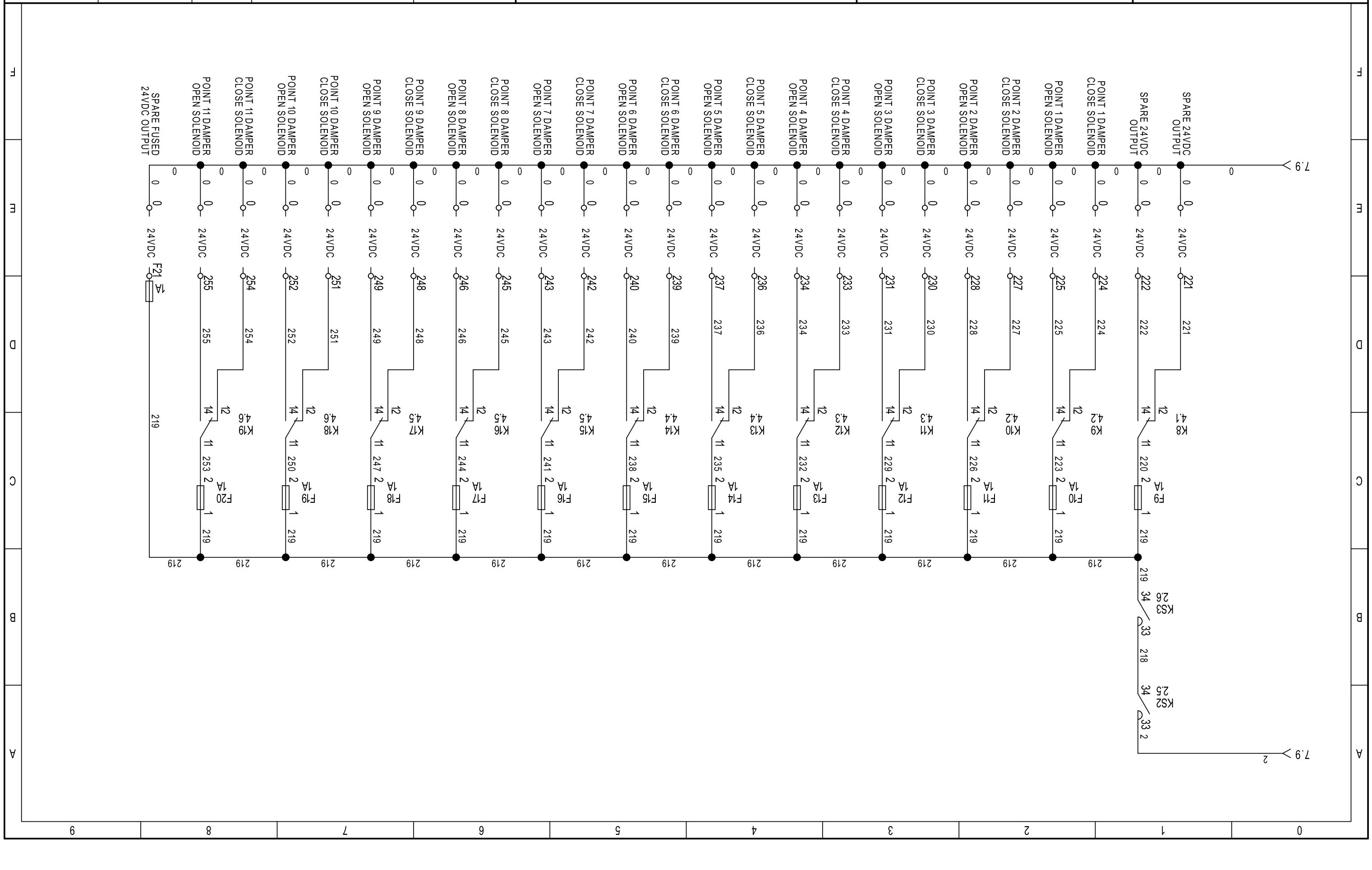
Duscovent Engineering	TATA Steel - Burning Booth Extraction System MAIN PANEL PLC I/O (PLC5/PLC6) W6485-007	Project: W6485.3-PC-3002	Drawing no.: W6485-007	Init: MGH	Rev.: 3	Sheet: 7
		Date: 25/06/2020	Job No.:	Location:	Total sheets: 18	Next sheet: 8



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			Date: 25/06/2020	Job No.:	Location:
			Sheet: 8	Rev.: 3	Total sheets: 18
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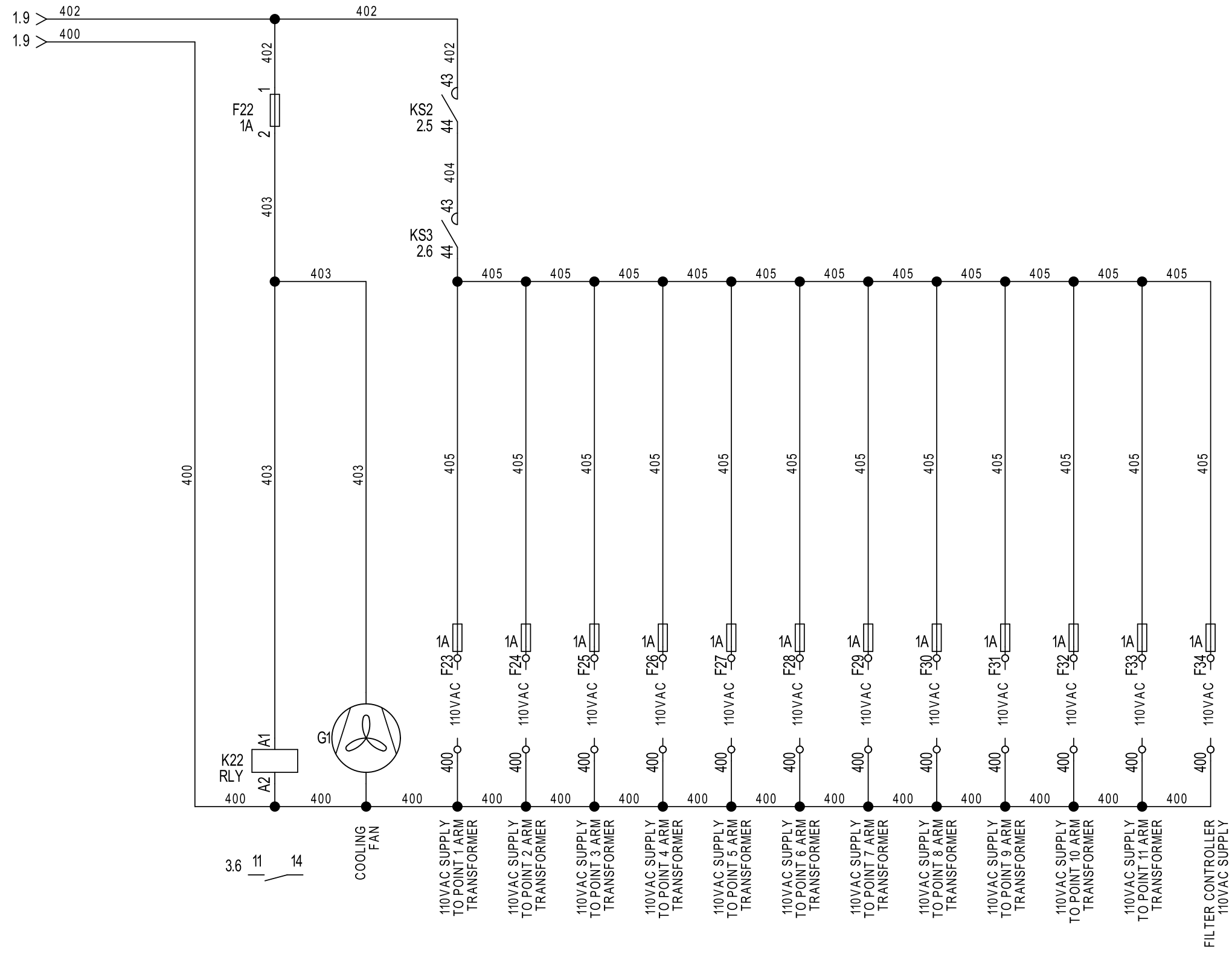

Key

RLY – Relay

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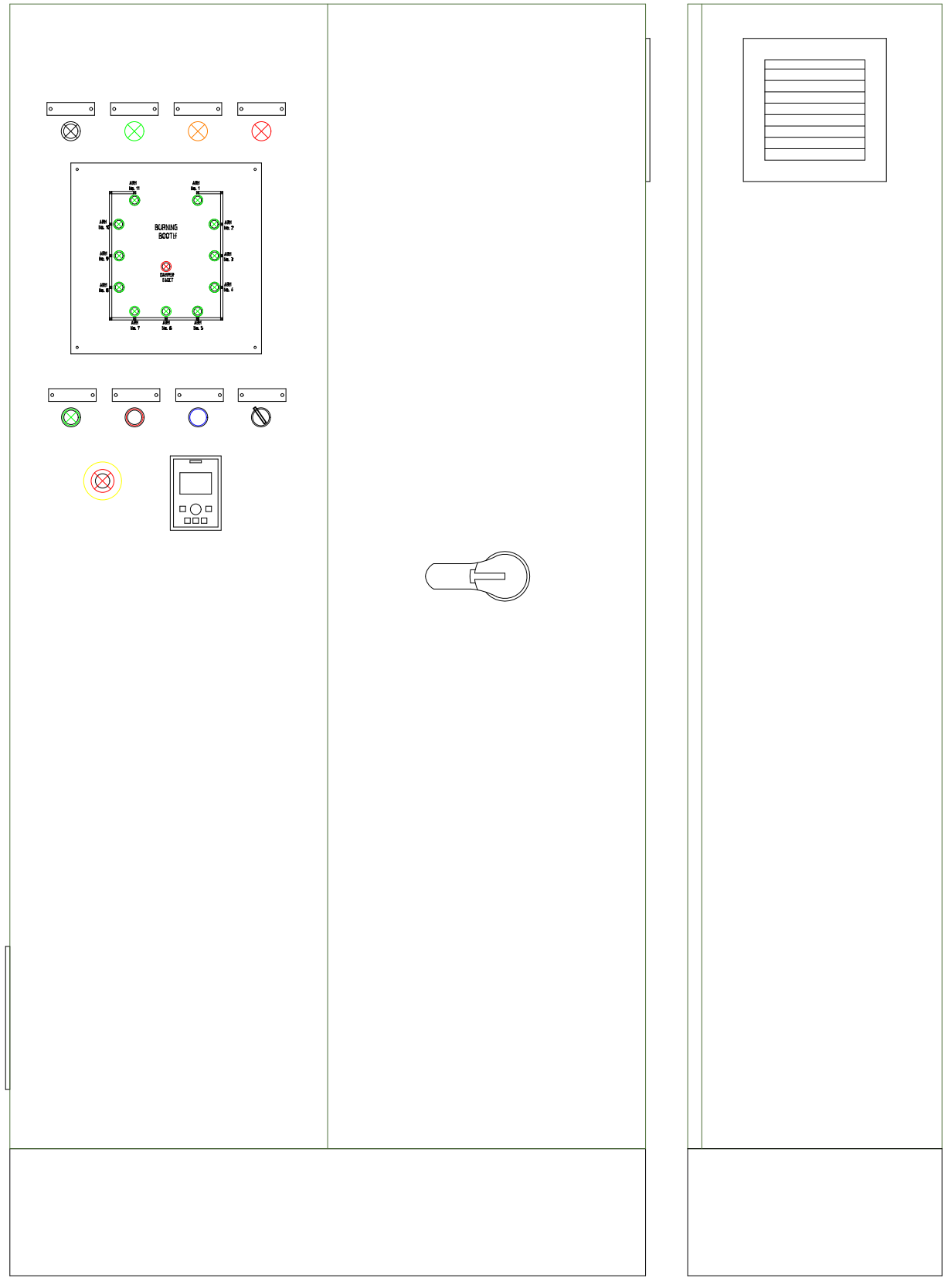
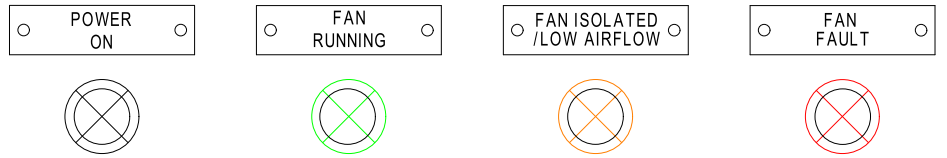
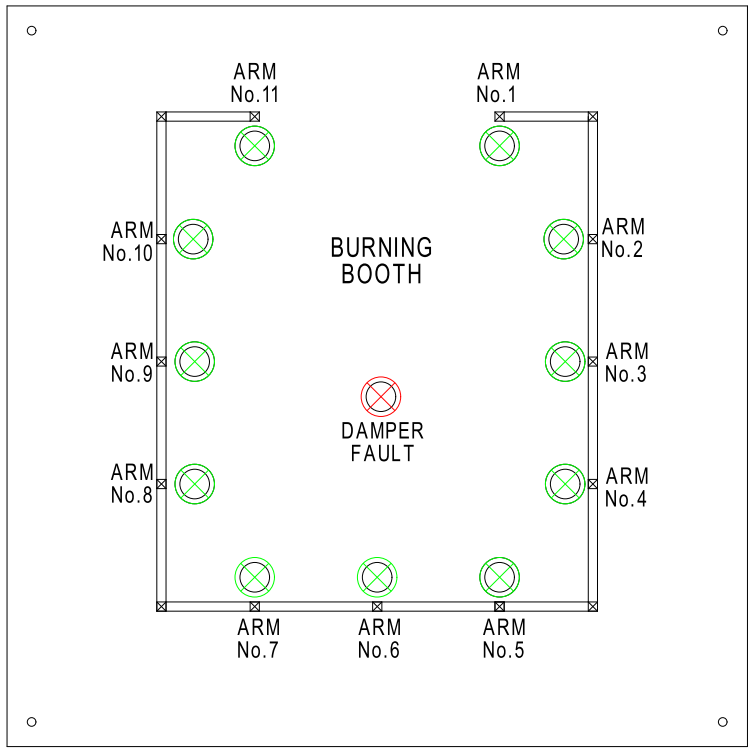
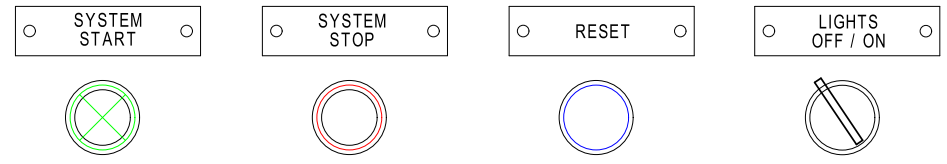
TATA Steel - Burning Booth Extraction System
MAIN PANEL 110VAC OUTPUTS
W6485-009

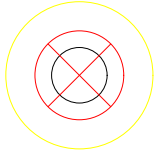
Project: W6485.3-PC-3002	Drawing no.: W6485-009		Init: MGH	Rev.: 3	Sheet: 9
Date: 25/06/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 10

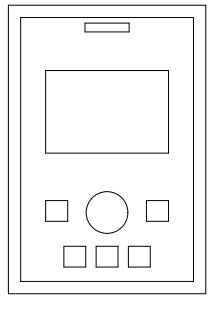












Provisional dimensions – 1000 x 1800 x 400mm (WxHxD)
with 200mm plinth

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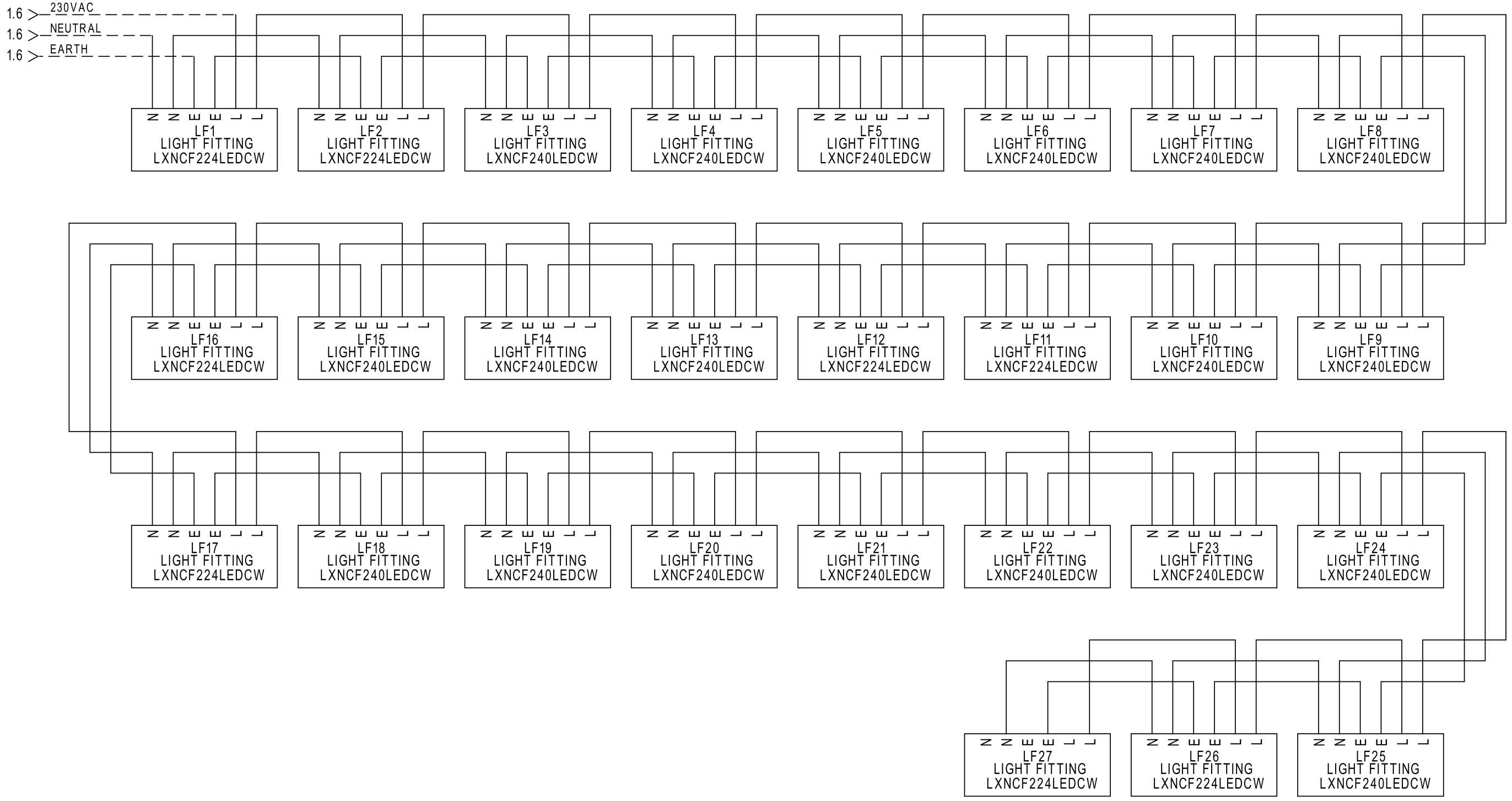
TATA Steel - Burning Booth Extraction System
MAIN PANEL LAYOUT
W6485-010

Project: W6485.3-PC-3002	Drawing no.: W6485-010		Init: MGH	Rev.: 3	Sheet: 10
Date: 25/06/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 11



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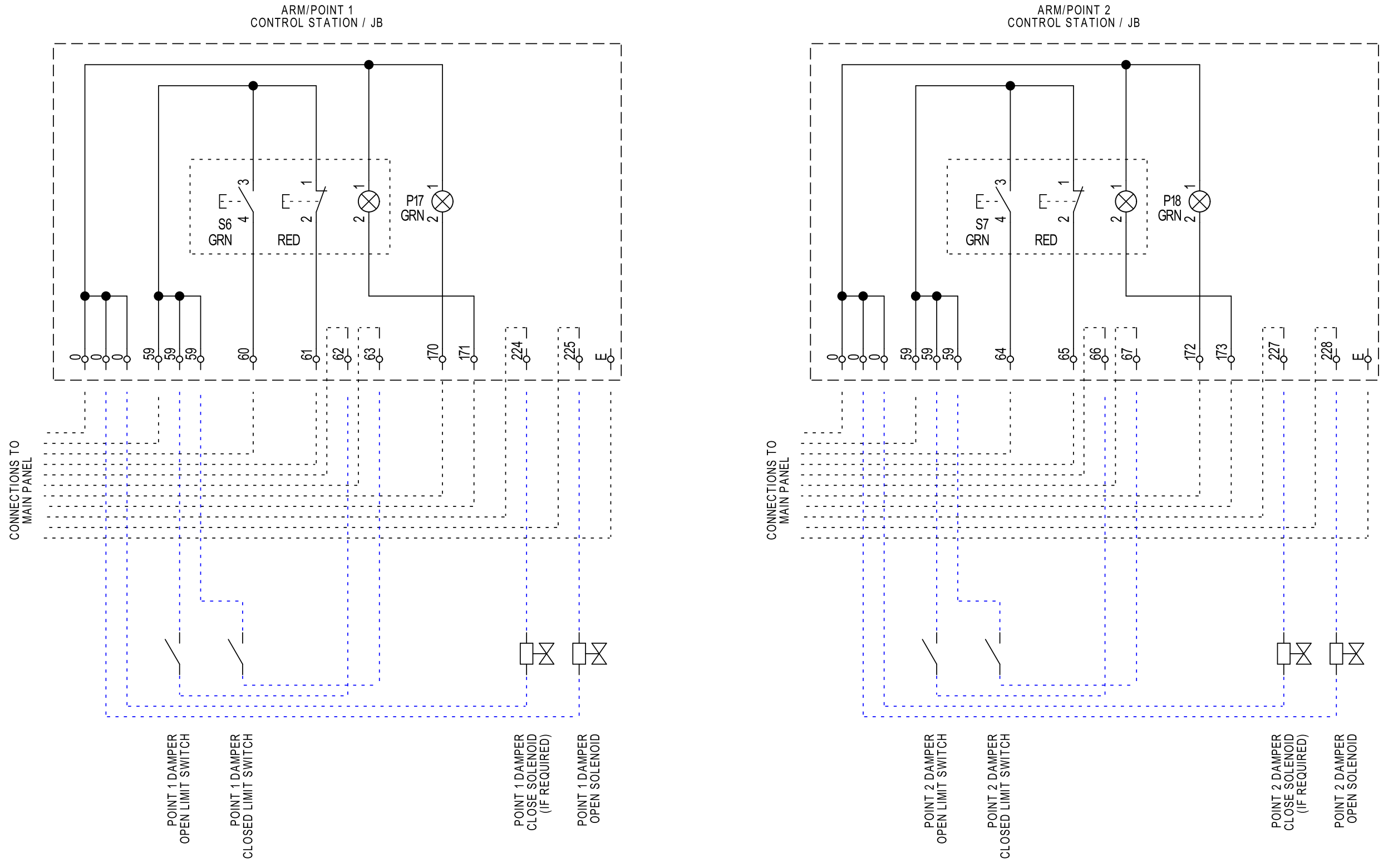
TATA Steel - Burning Booth Extraction System
230VAC LIGHTING CIRCUIT
W6485-011

Project: W6485.3-PC-3002	Drawing no.: W6485-011		Init: MGH	Rev.: 3	Sheet: 11
Date: 03/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 12



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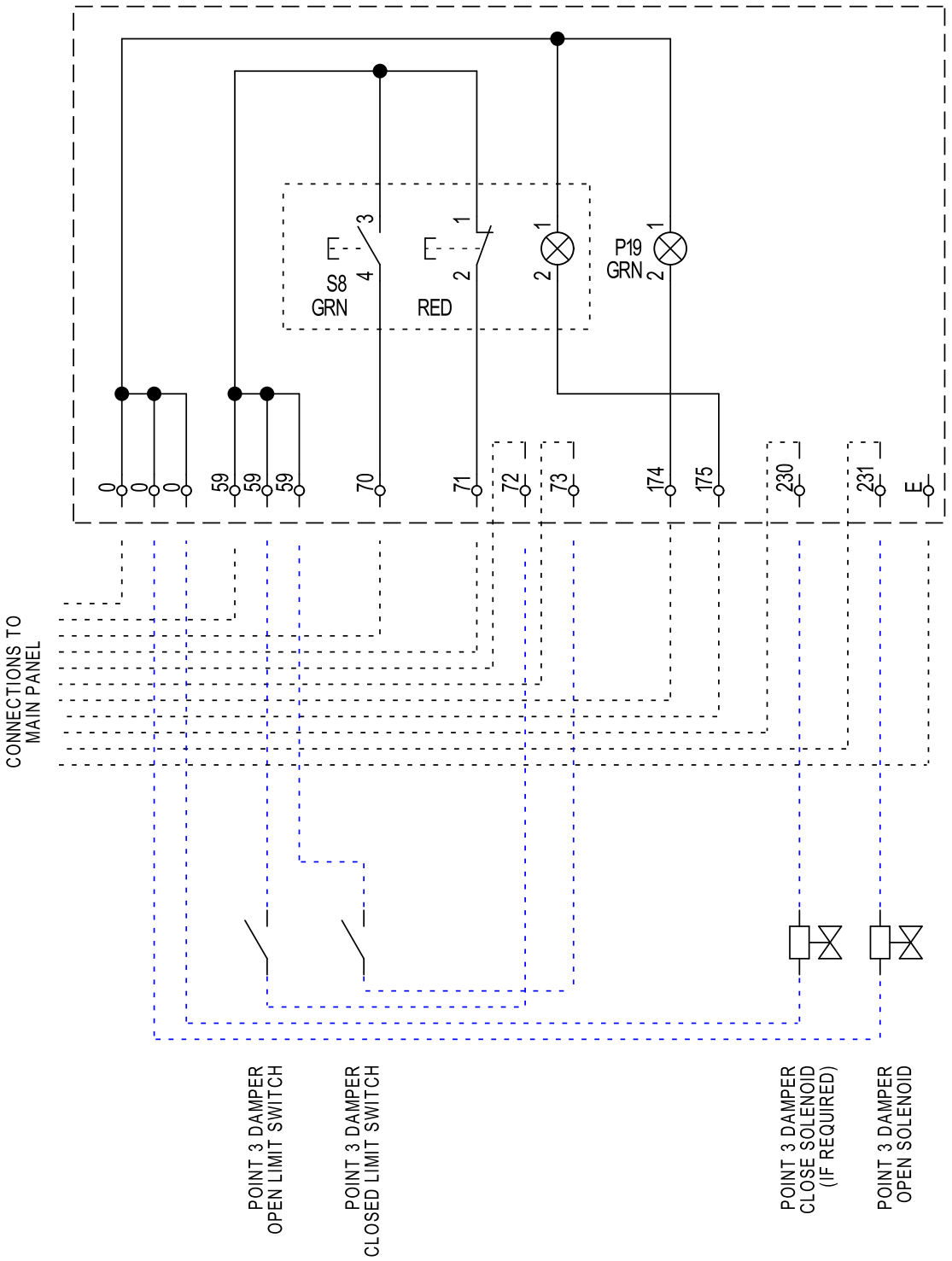
Duscovent Engineering

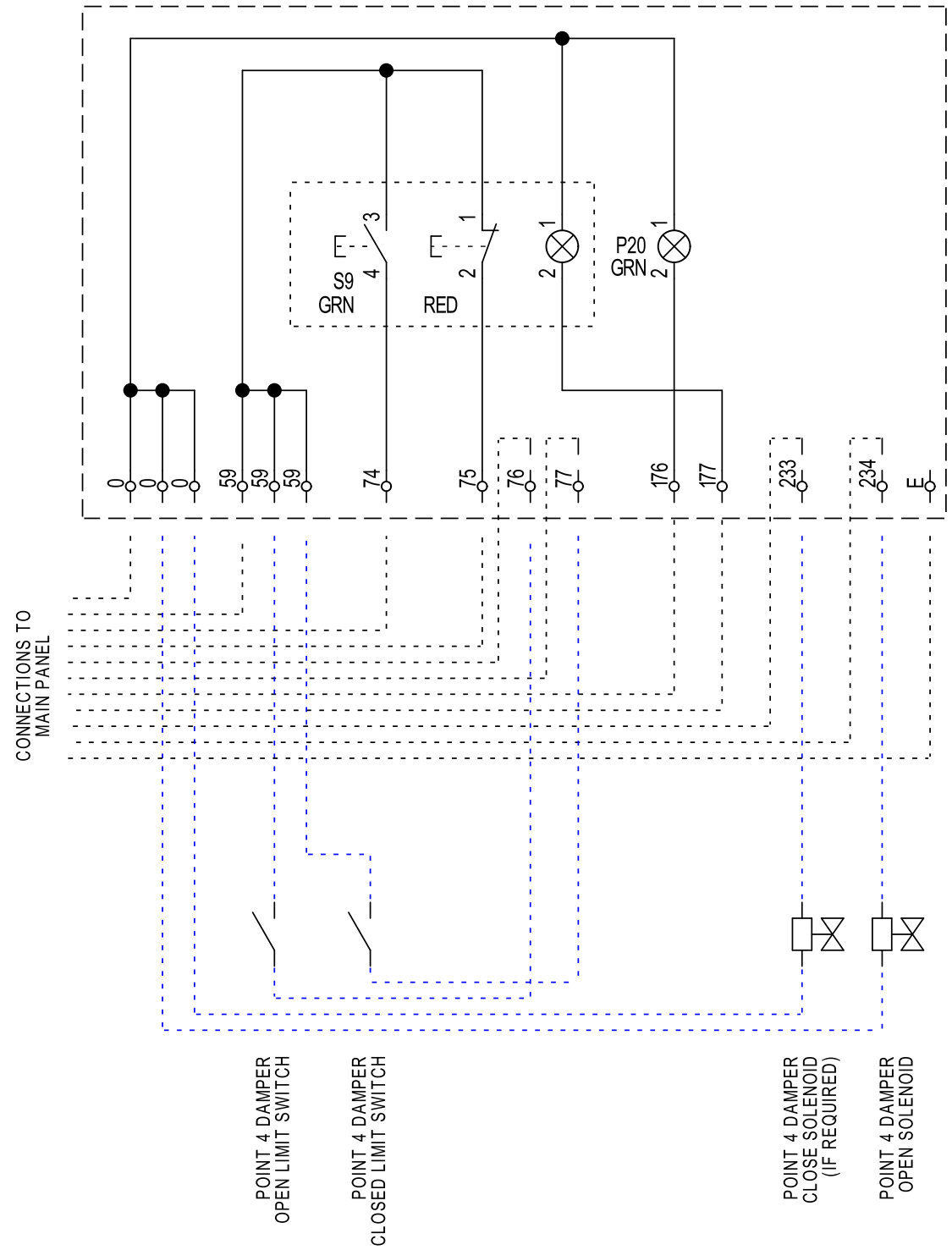
TATA Steel - Burning Booth Extraction System
POINT 1 / POINT 2 CONTROL STATIONS
W6485-012

Project:	Drawing no.:		Init:	Rev.:	Sheet:
W6485.3-PC-3002	W6485		MGH	3	12
Date:	Job No.:	Location:		Total sheets:	Next sheet:
07/07/2020				18	13

ARM/POINT 3
CONTROL STATION / JB



ARM/POINT 4
CONTROL STATION / JB



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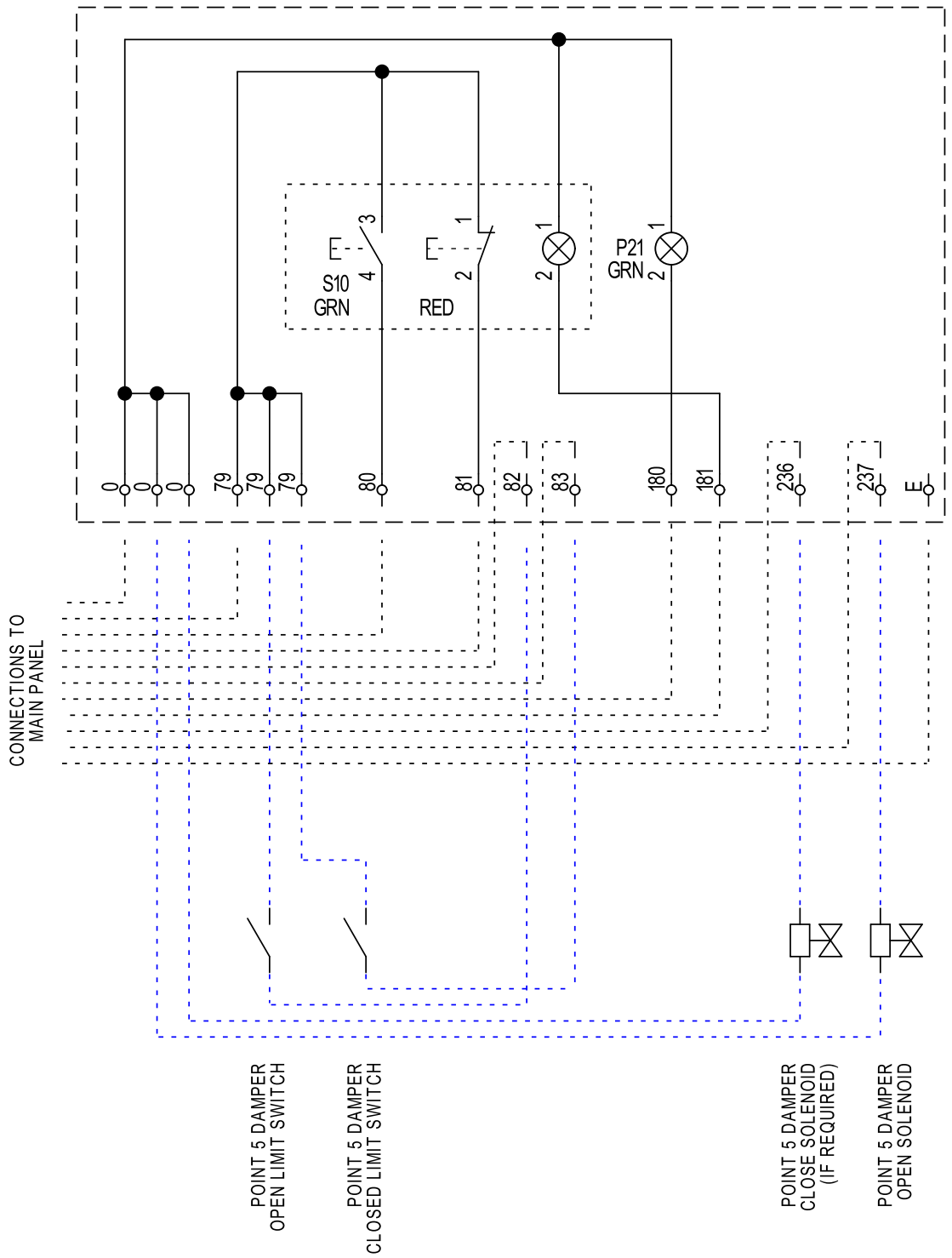
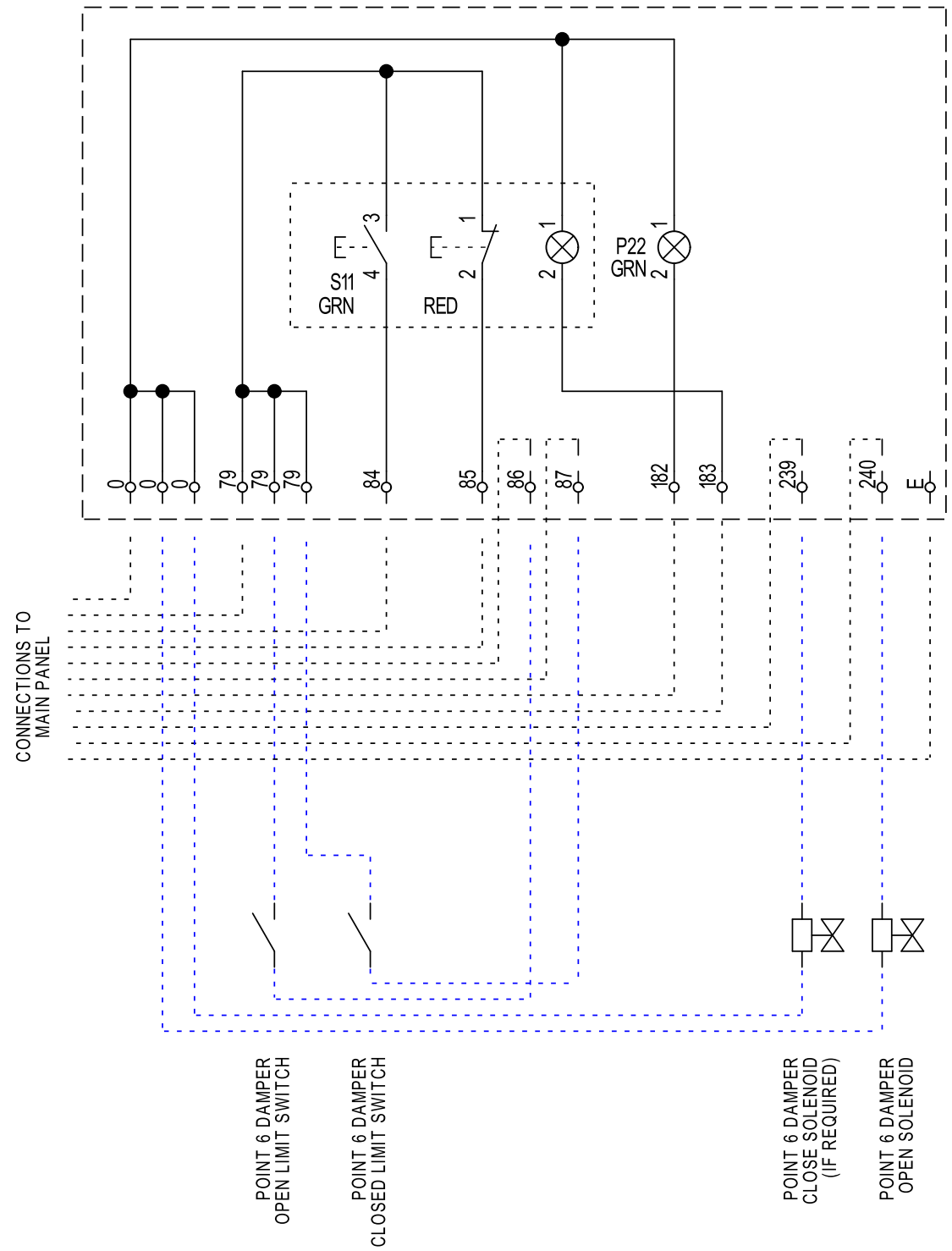
TATA Steel - Burning Booth Extraction System
POINT 3 / POINT 4 CONTROL STATIONS
W6485-013

Project: W6485.3-PC-3002	Drawing no.: W6485		Init: MGH	Rev.: 3	Sheet: 13
Date: 07/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 14

ARM/POINT 5
CONTROL STATION / JB



ARM/POINT 6
CONTROL STATION / JB



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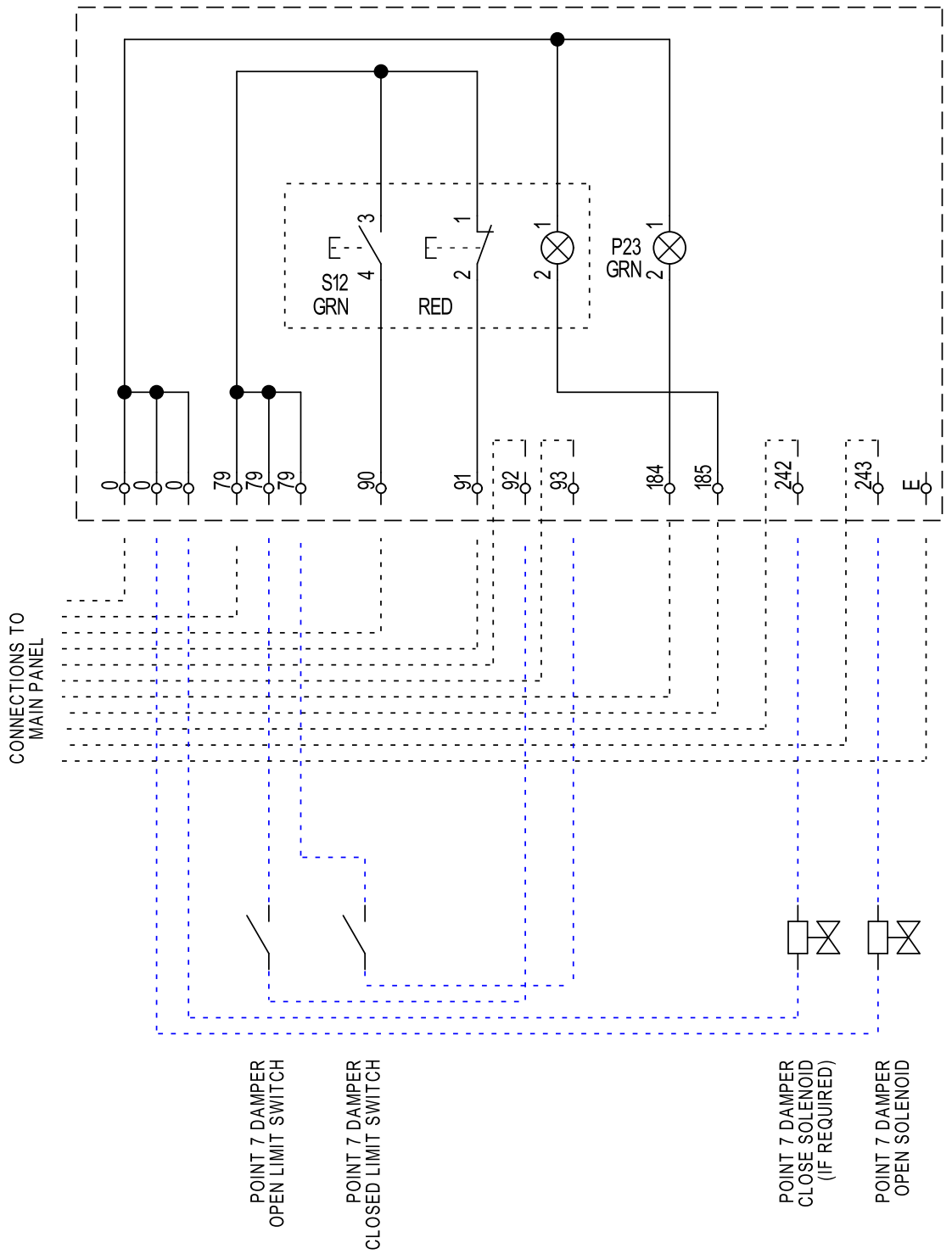
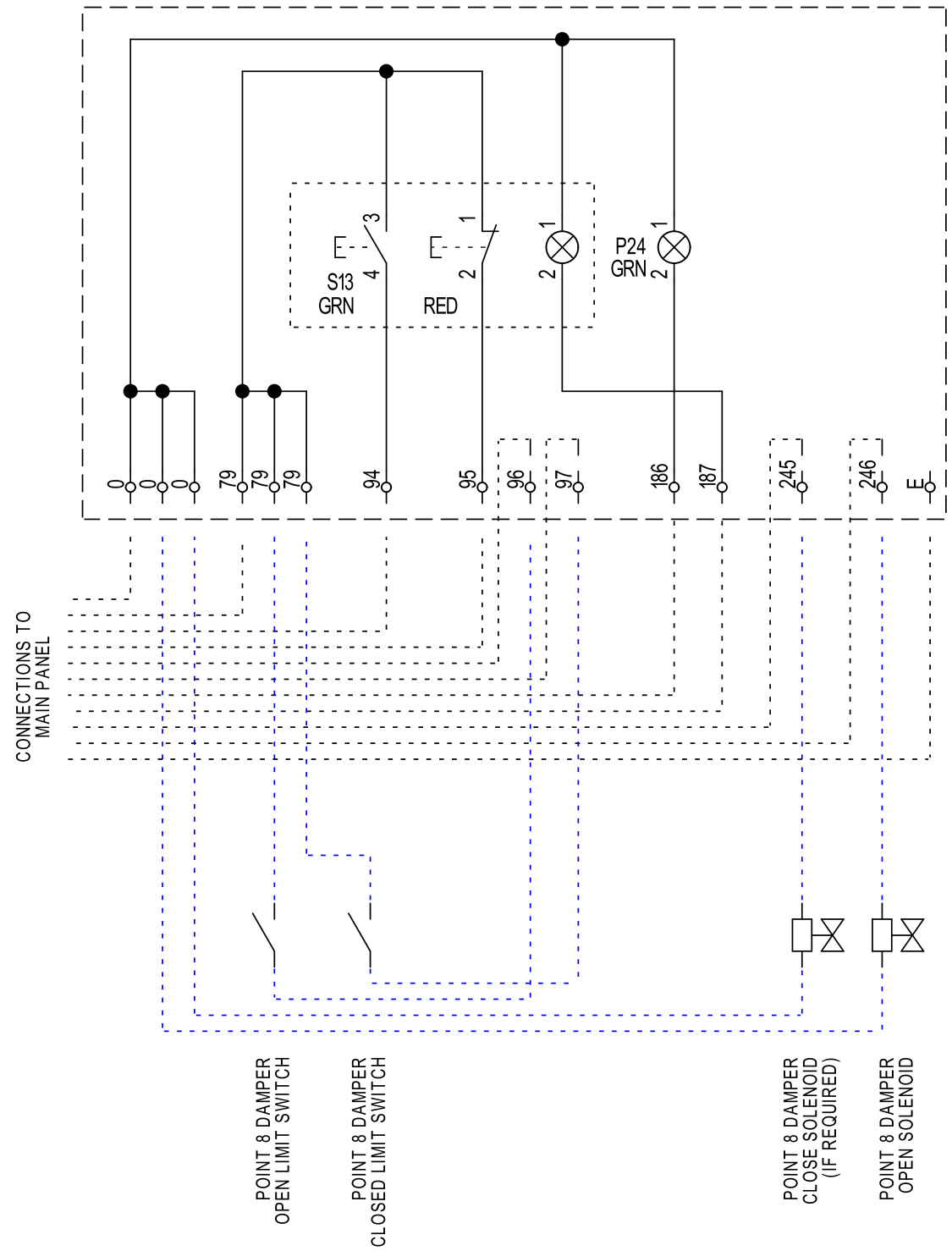
TATA Steel - Burning Booth Extraction System
POINT 5 / POINT 6 CONTROL STATIONS
W6485-014

Project: W6485.3-PC-3002	Drawing no.: W6485-014		Init: MGH	Rev.: 3	Sheet: 14
Date: 07/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 15

ARM/POINT 7
CONTROL STATION / JB



ARM/POINT 8
CONTROL STATION / JB



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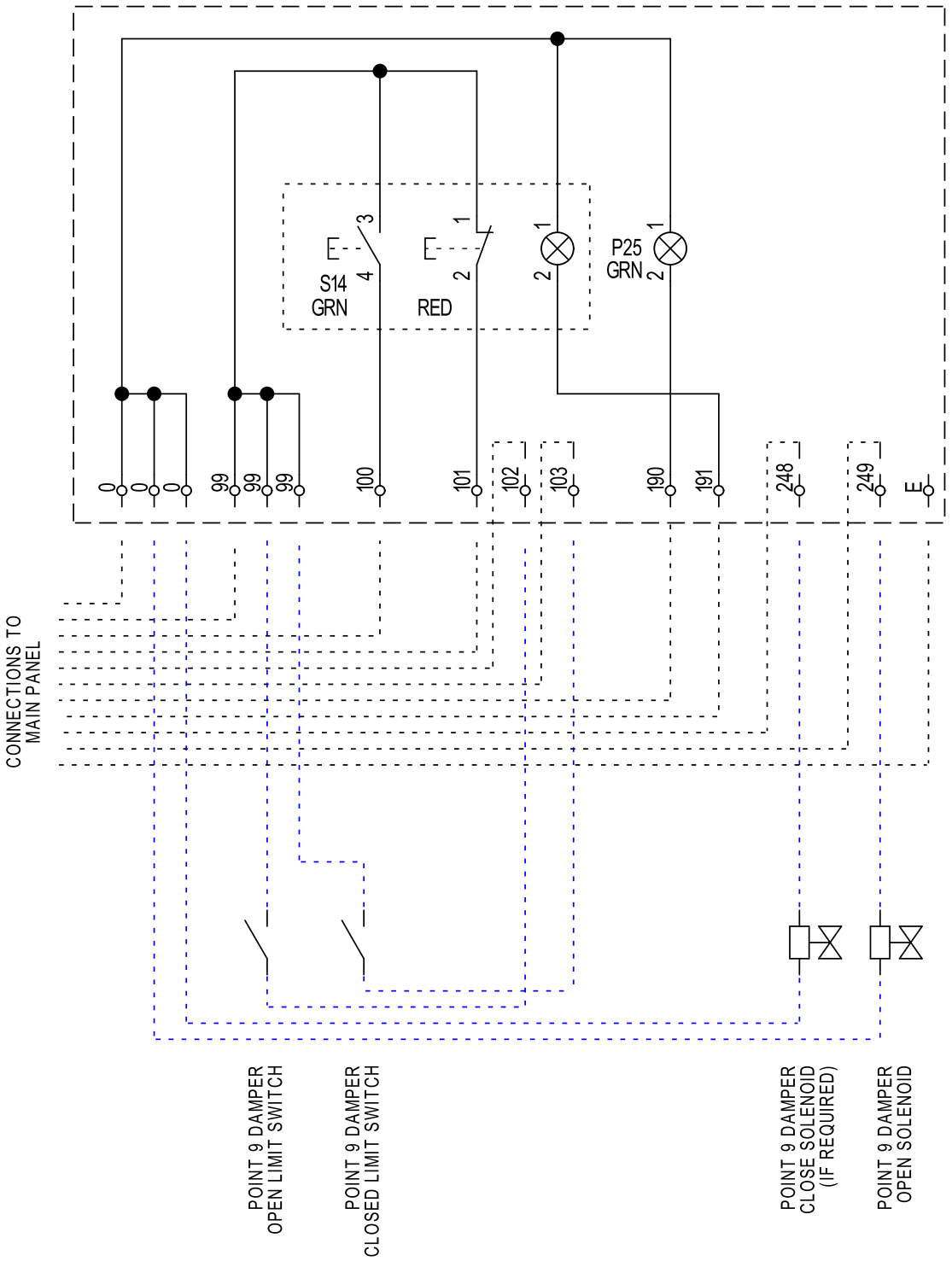
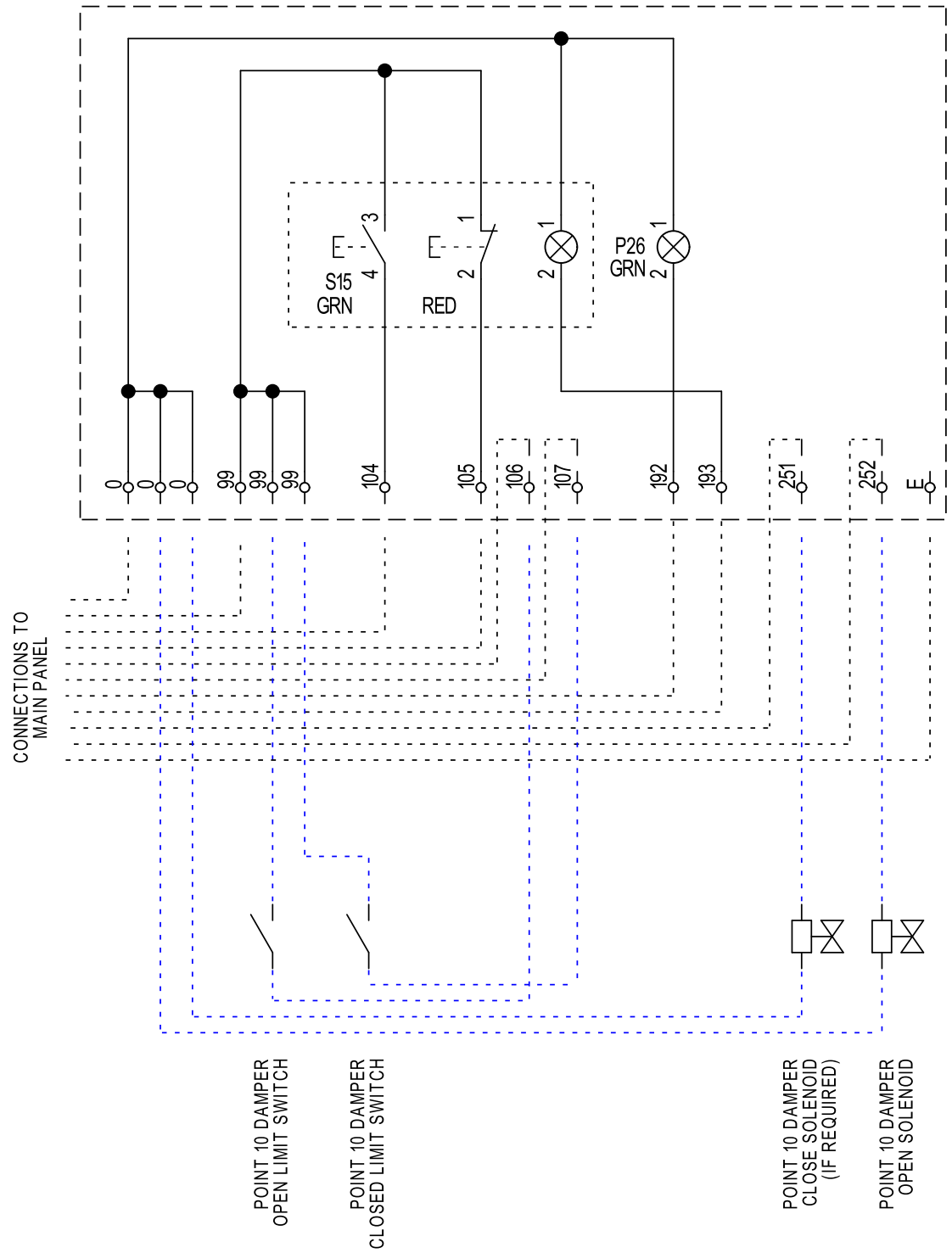
TATA Steel - Burning Booth Extraction System
POINT 7 / POINT 8 CONTROL STATIONS
W6485-015

Project: W6485.3-PC-3002	Drawing no.: W6485-015		Init: MGH	Rev.: 3	Sheet: 15
Date: 07/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 16

ARM/POINT 9
CONTROL STATION / JB



ARM/POINT 10
CONTROL STATION / JB



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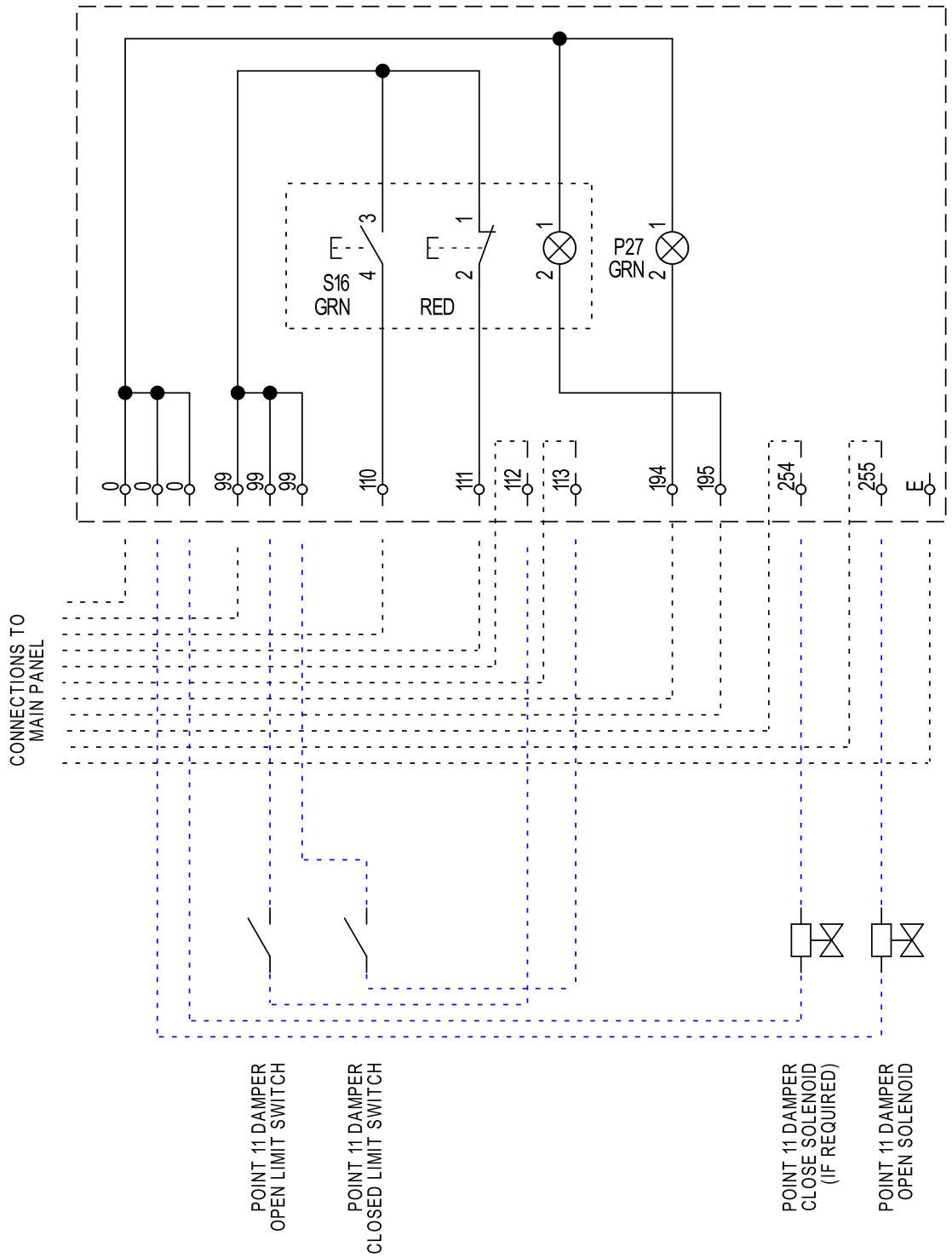
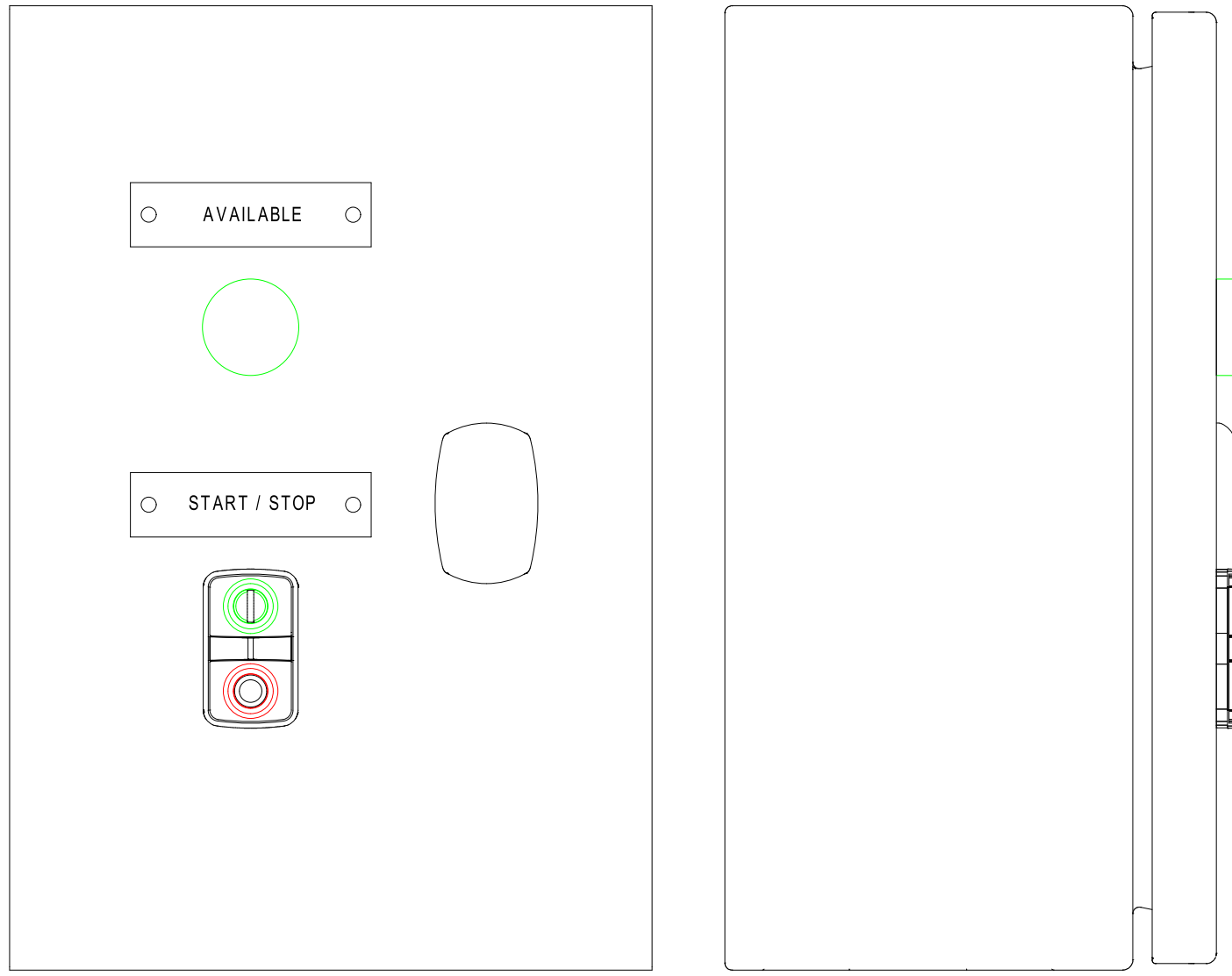
TATA Steel - Burning Booth Extraction System
POINT 9 / POINT 10 CONTROL STATIONS
W6485-016

Project: W6485.3-PC-3002	Drawing no.: W6485-016		Init: MGH	Rev.: 3	Sheet: 16
Date: 07/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 17

ARM/POINT 11
CONTROL STATION / JB





CONTROL STATION LAYOUT
DIMENSIONS 200 x 300 x 150mm (WxHxD)

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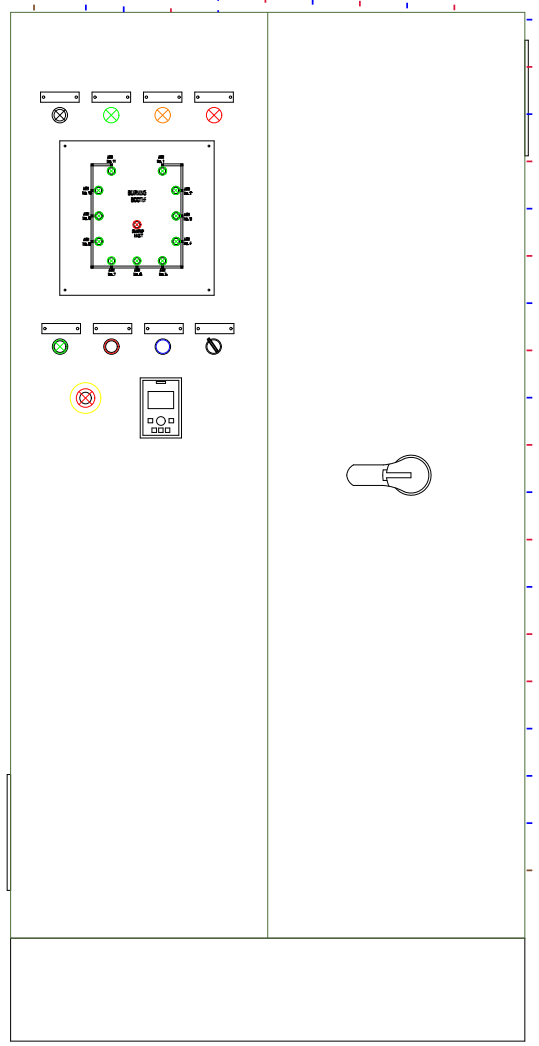
TATA Steel - Burning Booth Extraction System
POINT 11 CONTROL STATION / LAYOUT
W6485-017

Project: W6485.3-PC-3002	Drawing no.: W6485-017		Init: MGH	Rev.: 3	Sheet: 17
Date: 07/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet: 18

1. 415V MAINS SUPPLY
1. 6mm 5-Core



CABLE ENTRY POSITIONS T.B.C.

29. FAN PRESSURE SWITCH	29. 0.75mm 3-Core
28. POINT/ARM 11 CONTROL STATION	28. 0.75mm 12-Core
27. ARM 11 LED TRANSFORMER 110VAC	27. 1.5mm 3-Core
26. POINT/ARM 10 CONTROL STATION	26. 0.75mm 12-Core
25. ARM 10 LED TRANSFORMER 110VAC	25. 1.5mm 3-Core
24. POINT/ARM 9 CONTROL STATION	24. 0.75mm 12-Core
23. ARM 9 LED TRANSFORMER 110VAC	23. 1.5mm 3-Core
22. POINT/ARM 8 CONTROL STATION	22. 0.75mm 12-Core
21. ARM 8 LED TRANSFORMER 110VAC	21. 1.5mm 3-Core
20. POINT/ARM 7 CONTROL STATION	20. 0.75mm 12-Core
19. ARM 7 LED TRANSFORMER 110VAC	19. 1.5mm 3-Core
18. POINT/ARM 6 CONTROL STATION	18. 0.75mm 12-Core
17. ARM 6 LED TRANSFORMER 110VAC	17. 1.5mm 3-Core
16. POINT/ARM 5 CONTROL STATION	16. 0.75mm 12-Core
15. ARM 5 LED TRANSFORMER 110VAC	15. 1.5mm 3-Core
14. POINT/ARM 4 CONTROL STATION	14. 0.75mm 12-Core
13. ARM 4 LED TRANSFORMER 110VAC	13. 1.5mm 3-Core
12. POINT/ARM 3 CONTROL STATION	12. 0.75mm 12-Core
11. ARM 3 LED TRANSFORMER 110VAC	11. 1.5mm 3-Core
10. POINT/ARM 2 CONTROL STATION	10. 0.75mm 12-Core
9. ARM 2 LED TRANSFORMER 110VAC	9. 1.5mm 3-Core
8. POINT/ARM 1 CONTROL STATION	8. 0.75mm 12-Core
7. ARM 1 LED TRANSFORMER 110VAC	7. 1.5mm 3-Core
6. 230VAC LIGHTING CIRCUIT	6. 1.5mm 3-Core
5. BLEED VALVE ACTUATOR	5. 0.75mm 4-Core
4. FAN MOTOR ISOLATOR AUX	4. 0.75mm 3-Core
3. FAN MOTOR THERMISTOR (IF REQUIRED)	3. 0.75mm 3-Core
2. FAN MOTOR 415V SUPPLY (VIA LOCAL ISOLATOR)	2. 4mm 4-Core

415VAC
230/110VAC
24VDC

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TATA Steel - Burning Booth Extraction System
MAIN PANEL CABLE CONNECTIONS
W6485-018

Project: W6485.3-PC-3002	Drawing no.: W6485-018		Init: MGH	Rev.: 3	Sheet: 18
Date: 07/07/2020	Job No.:	Location:		Total sheets: 18	Next sheet:

SECTION NO.9b.

DIFFERENTIAL PRESSURE SWITCH.

BECK No REF 930.87 RANGE 1000 TO 5000 Pa.

Beck.

The adjustable differential pressure switches.

Differential pressure switch 930.8x Climair®

with adjustable switching pressure

Applications

Adjustable differential pressure switch for monitoring overpressure, vacuum and differential pressure of air or other non-combustible, non-aggressive gases. Possible fields of application include:

- Monitoring air filters and ventilators
- Monitoring industrial cooling-air circuits
- Overheating protection for fan heaters
- Monitoring flows in ventilation ducts
- Controlling air and fire-protection flaps
- Frost protection for heat exchangers

Versions

With this pressure switch the switching pressure can be adjusted without a pressure gauge using a scaled adjustment knob. The switching differential can also be adjusted with a screwdriver.

Type	Adjustment range for upper switching pressure from to	Switching differential set to	Tolerance for upper and lower switching pressure
930.80	20 300 Pa	10 Pa	± 15%
930.84	30 400 Pa	15 Pa	± 15%
930.83	50 500 Pa	20 Pa	± 15%
930.85	200 1000 Pa	100 Pa	± 15%
930.86	500 2500 Pa	150 Pa	± 15%
930.87	1000 5000 Pa	250 Pa	± 15%

Switching pressure specifications apply to vertical installation which is also the recommended position with pressure-pipe connections pointing downwards. If the switches are installed horizontally with AMP connection terminals uppermost, the switching values are approx. 20 Pa higher.

Maximum operating pressure

10 kPa for all pressure ranges.

Medium

Air, non-combustible and non-aggressive gases.

Temperature range

Medium and ambient temperature from –20°C to +85°C.
Storage temperature from –40°C to +85°C.

Diaphragm material

Silicone, tempered at 200°C, free of gas emissions.
Other materials available on request.

Pressure connections

2 plastic pipe connection pieces (P1 and P2), external diameter 6.0 mm:
P1 for connection to higher pressure (marked +)
P2 for connection to lower pressure (marked –)

Housing materials

Switch body made of PA 6.6.
Cover made of PS.

Weight

With cover 150 g
Without cover 110 g

Mechanical working life

Over 10^6 switching operations.

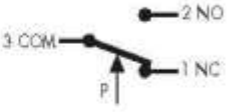
Electrical rating

Standard version	max. 1.0 A (0.4 A) / 250 VAC
Low-voltage version	max. 0.1 A / 24 VDC

Electrical connections

AMP flat plug 6.3x0.8 mm in accordance with DIN 46244 or push-on screw terminals.
Cable conduit with cable strain relief.

Arrangement of contacts



1 Break contact
2 Operating contact
3 Power supply line

Protection category

IP 54 with cover
IP 00 without cover

CE Conformity

each depending on technical specification: Low Voltage Directive 2006/95/EC; RoHS Directive 2002/95/EC; Gas Appliance Directive 90/396/EC; ATEX- Directive 94/9/EC; ANSI UL508; CSA.

Accessories

See order matrix.

Order matrix

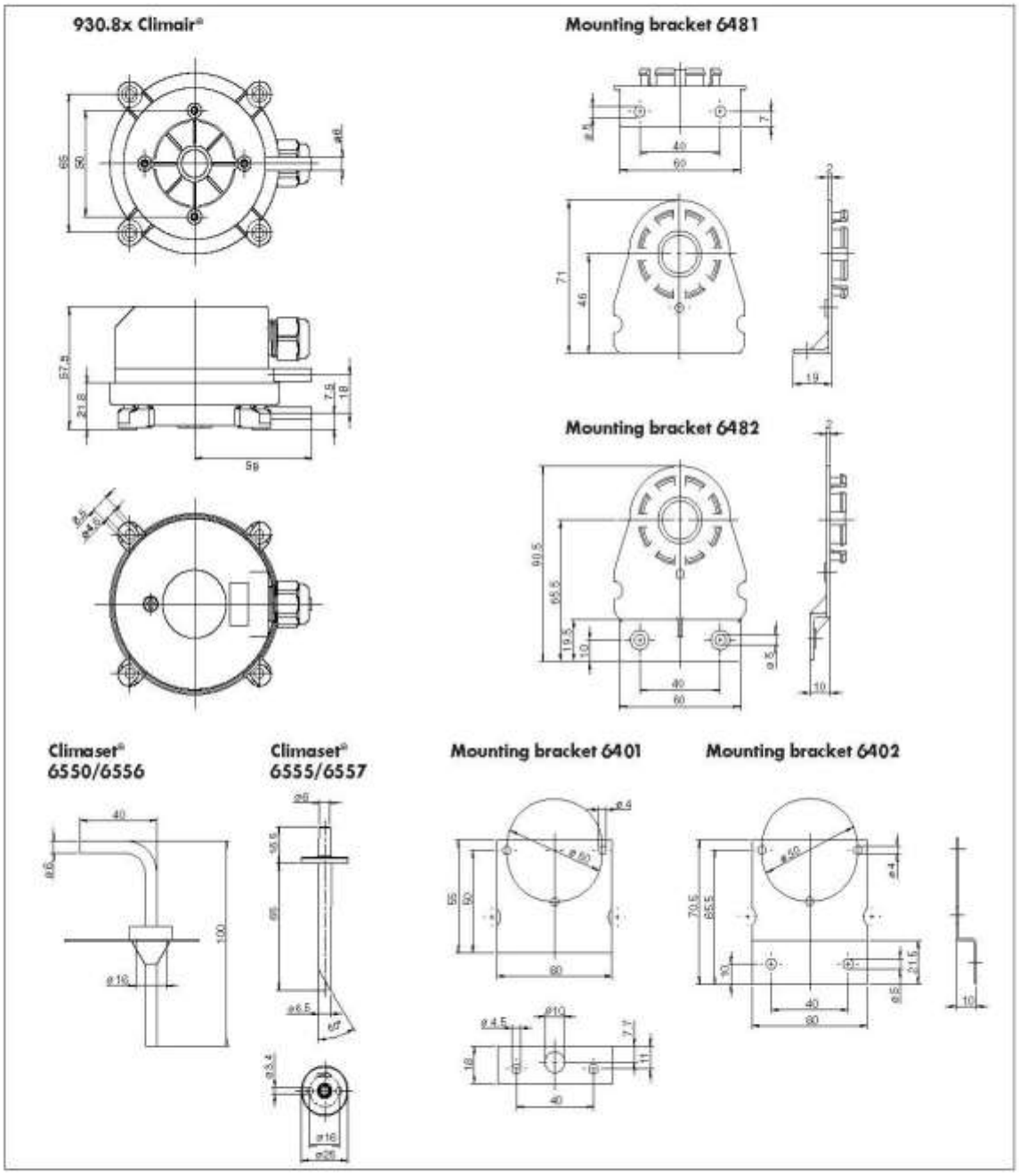
Pressure ranges	20 to 300 Pascal (0.2 to 3.0 mbar)	**930.8**	**0**						
	30 to 400 Pascal (0.3 to 4.0 mbar)		**4**						
	50 to 500 Pascal (0.5 to 5.0 mbar)		**3**						
	200 to 1000 Pascal (2.0 to 10.0 mbar)		**5**						
	500 to 2500 Pascal (5.0 to 25.0 mbar)		**6**						
	1000 to 5000 Pascal (10 to 50 mbar)		**7**						
Switching contacts	gold-plated for low voltages, screw terminals enclosed			1					
	up to maximum 1.0 A (0.4) / 250 VAC, screw terminals enclosed			2					
	up to maximum 1.0 A (0.4) / 250 VAC with 6.3x0.8 mm flat plugs			3					
	gold-plated for low voltages with 6.3x0.8 mm flat plugs			4					
Fitting method	mounted directly without bracket				2				
Adjustment knob	scale in mbar					1			
	scale in Pascal					2			
	scale in Pascal and inWC					3			
IP protection category	IP 54 with cable conduit M16						5		
	IP 54 with cable conduit M20x1.5						2		
	IP 54 with cable conduit NPT1/2"						3		
	IP 00 without cover						4		
Packaging	bulk packed, 45 pcs. per carton							1	
	bulk packed, folding boxes included							2	
	individually boxed							3	
Accessories	without accessories								1
	with S-shaped metal mounting bracket 6402								2
	with L-shaped metal mounting bracket 6401								3
	with Climaset® 6555								4
	with Climaset® 6550								5
	with S-shaped metal mounting bracket 6402 and Climaset® 6555								6
	with S-shaped metal mounting bracket 6402 and Climaset® 6550								7
	with L-shaped metal mounting bracket 6401 and Climaset® 6555								8
	with L-shaped metal mounting bracket 6401 and Climaset® 6550								9
	with S-shaped snap-on plastic bracket 6482								A
	with L-shaped snap-on plastic bracket 6481								B
	with S-shaped snap-on plastic bracket 6482 and Climaset® 6555								C
	with S-shaped snap-on plastic bracket 6482 and Climaset® 6550								D
	with L-shaped snap-on plastic bracket 6481 and Climaset® 6555								E
	with L-shaped snap-on plastic bracket 6481 and Climaset® 6550								F

Accessories

Metal mounting bracket S-shaped	Article No. 6402
Metal mounting bracket L-shaped	Article No. 6401
Snap-on plastic bracket S-shaped	Article No. 6482
Snap-on plastic bracket L-shaped	Article No. 6481
Climaset® consisting of 2 m PVC hose and 2 plastic tubes	Article No. 6555
Climaset® consisting of 2 m Silicone hose and 2 plastic tubes	Article No. 6557
Climaset® consisting of 2 m PVC hose and 2 angled metal pipes	Article No. 6550
Climaset® consisting of 2 m Silicone hose and 2 angled metal pipes	Article No. 6556
Set consisting of three push-on screw terminals	Article No. 6415
Plastic tube for Climaset® 6555	Article No. 6551
Angled metal pipe for Climaset® 6550	Article No. 6552
Rubber grommet for Climaset® 6550	Article No. 6553
Roll with 100 m PVC hose	Article No. 6424
M16 cable conduit including sealing and counter screw	Article No. 6562
M20x1.5 cable conduit including sealing and counter screw	Article No. 6568
NPT1/2" cable conduit without counter parts	Article No. 6561
Cardbox for single packing (without accessories)	Article No. 6428
Cardbox for single packing (with accessories)	Article No. 6429

Differential pressure switches
930.8x Climair®

with adjustable switching pressure



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Quality Management
We are certified

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SECTION NO. 10.

SPARES LIST

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Duscovent

Industrial Ventilation
Air Pollution Control
Central Vacuum Systems
Dust Suppression

EQUIPMENT

1. Primary filter
2. Secondary filter
3. Fan set
4. Extract arms
5. Leg dampers (elec actuated)
6. Modulating dampers (elec actuated)
7. Electrical system

Please note: -
Major spares fully listed as follows, critical spares in **BOLD**.
It may be prudent to hold stock to allow for any emergency repairs to be the L.E.V system to be carried out.

Primary Filter DF PRO-4			
4	**Cartridges**		
1	Door seal type 1 - 10 meters		
1	Door / bin seal type 2 - 10 meters		
4	Diaphragm valve		
4	Repair kit for diaphragm valve		

Secondary Filter			
2	**H13 - HEPA filters**		
2	G4 - CB panel pre-filters		

Halifax Fans Chinook 21.5			
1	Fan impellor		
1	11 kw motor ABB IE3		
1	Outlet flexible		
1	Inlet flexible		
4	AV mounts (per set)		
1	Shaft seal and retaining PLT		

Extract Arms			
1	Full Ø200 PRX arm inc LED light		
1	Full Ø160 PRX arm inc LED light		
1	**PRX-T - tube**		
1	**PRX - J - joints**		
1	**PRXSDS - hood**		
1	**PR - LED**		

Leg Dampers - Elec / actuated			
1	Ø175 throttle valve, C/W 24 v el-actuator		
1	Ø200 throttle valve C/W 24 v el-actuator		
1	24 v el-actuator		

Modulating Damper			
1	Modulating damper C/W 24 v Belimo act		
1	24 v Belimo actuator		

Panel Components			
1	11 kw inverter		
1	11 kw MCB		
1	6A MCB		
1	Power supply		
1	CPU		
1	Conveyor		
2	**2 pole relays 24 v DC**		
1	**LED - 16mm - red or green**		
1	**LED - 22.5mm - amber, red or green**		
2	**Filter pads for vent fan**		
1	**Differential pressure switch - 1000 to 5000 pascals**		