# SDS

# INSTALLATION GUIDE

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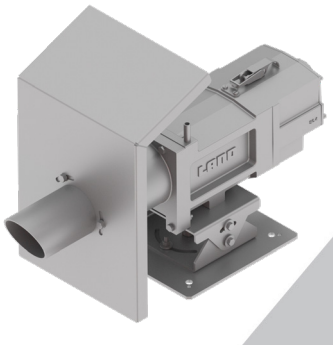

Slag Detection System

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# IMPORTANT INFORMATION - PLEASE READ

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PROCESS & ANALYTICAL INSTRUMENTS

## Health and Safety Information

**Read all of the instructions in this booklet - including all the WARNINGS and CAUTIONS - *before* using this product. If there is any instruction which you do not understand, DO NOT USE THE PRODUCT.**

### Safety Signs

**WARNING**
Indicates a potentially hazardous situation which, if not avoided, could result in death or personal injury.

**CAUTION**
Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to the user or users, or result in damage to the product or to property.

**NOTE**
Indicates a potentially hazardous situation which, if not avoided, could result in damage or loss of data.

### Signs and Symbols used on equipment and Documentation


Caution, risk of electric shock.


Caution, attention to possibility of risk of damage to the product, process or surroundings. Refer to instruction manual.


Caution, hot surface.


Protective Conductor Terminal.


Observe precautions for handling electrostatic discharge sensitive devices.

### Equipment Operation

Use of this instrument in a manner not specified by AMETEK Land may be hazardous. Read **and understand** the user documentation supplied **before** installing and operating the equipment.

The safety of any system incorporating this equipment is the responsibility of the assembler.

### Protective Clothing, Face and Eye Protection

It is possible that this equipment is to be installed on, or near to, machinery or equipment operating at high temperatures and high pressures. Suitable protective clothing, along with face and eye protection must be worn. Refer to the health and safety guidelines for the machinery/equipment before installing this product. If in doubt, contact AMETEK Land.


Wear Protective Gloves


Wear Protective Clothing


Wear Eye Protection


Wear Ear Protection


Wear Safety Boots


Wear Face Protection

### Electrical Power Supply

Before working on the electrical connections, all of the electrical power lines to the equipment must be isolated. All the electrical cables and signal cables must be connected exactly as indicated in these operating instructions. If in doubt, contact AMETEK Land.

## Contact Us


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For further details on all AMETEK Land offices, distributors and representatives, please visit our website.

### Storage

The instrument should be stored in its packaging, in a dry sheltered area.

The maximum storage temperature is 10 °C (18 °F) higher than the maximum operating temperature.

The minimum storage temperature is 10 °C (18 °F) lower than the minimum operating temperature.

Refer to the Technical Specification for details of the operating temperature limits.

### Unpacking

Check all packages for external signs of damage. Check the contents against the packing note.

### Lifting Instructions

Where items are too heavy to be lifted manually, use suitably rated lifting equipment. Refer to the Technical Specification for weights. All lifting should be carried out in accordance with local and national regulations.

### Return of Damaged Goods

IMPORTANT If any item has been damaged in transit, this should be reported to the carrier and to the supplier immediately. Damage caused in transit is the responsibility of the carrier not the supplier.

DO NOT RETURN a damaged instrument to the sender as the carrier will not then consider a claim. Save the packing with the damaged article for inspection by the carrier.

### Return of Goods for Repair

If you need to return goods for repair please contact our Customer Service Department for details of the correct returns procedure.

Any item returned to AMETEK Land should be adequately packaged to prevent damage during transit.

You must include a written report of the problem together with your own name and contact information, address, telephone number, email address etc.

### Design and Manufacturing Standards

The Quality Management System of Land Instruments International is approved to BS EN ISO 9001 for the design, manufacture and on-site servicing of combustion, environmental monitoring and non-contact temperature measuring instrumentation.

Registered ISO 9001 Management System approvals apply in the USA.

UK Calibration Laboratory: UKAS 0034.

USA Calibration Laboratory: ANAB Accredited ISO/IEC 17025.

National Accreditation Board for Testing and Calibration Laboratories approvals apply in India.

Operation of radio transmitters, telephones or other electrical/electronic devices in close proximity to the equipment while the enclosure doors of the instrument or its peripherals are open, may cause interference and possible failure where the radiated emissions exceed the EMC directive.

The protection provided by this product may be invalidated if alterations or additions are made to the structural, electrical, mechanical, pneumatic, software or firmware components of this system. Such changes may also invalidate the standard terms of warranty.

### Copyright

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# 1 INTRODUCTION

**This Installation Guide gives you information on how to install and set up the AMETEK Land Slag Detection System (SDS)**

## 1.1 About SDS

The AMETEK Land Slag Detection System (SDS) comprises:

- SDS-640 Thermal Imaging Camera
- UL Approved Power Supply Unit
- Air Blower
- Process Imaging Workstation running SDS Software
- IO Module

SDS enables you to:

- Monitor the level of slag present during the pouring of molten metal
- Improve production yields
- Lower slag content and improve steel quality
- Reduce maintenance on BOF / EAF vessels
- Reduce energy costs

SDS features include:

- Automatic stream identification and tracking accurately identifies the stream and reduces background interference
- Alarms generated by SDS directly stop the tap before the slag is carried over
- Fully automatic operation
- Accurate detection independent of charge weight
- Reliable alarm independent of the operator
- Improved connectivity

# 2 SYSTEM OVERVIEW

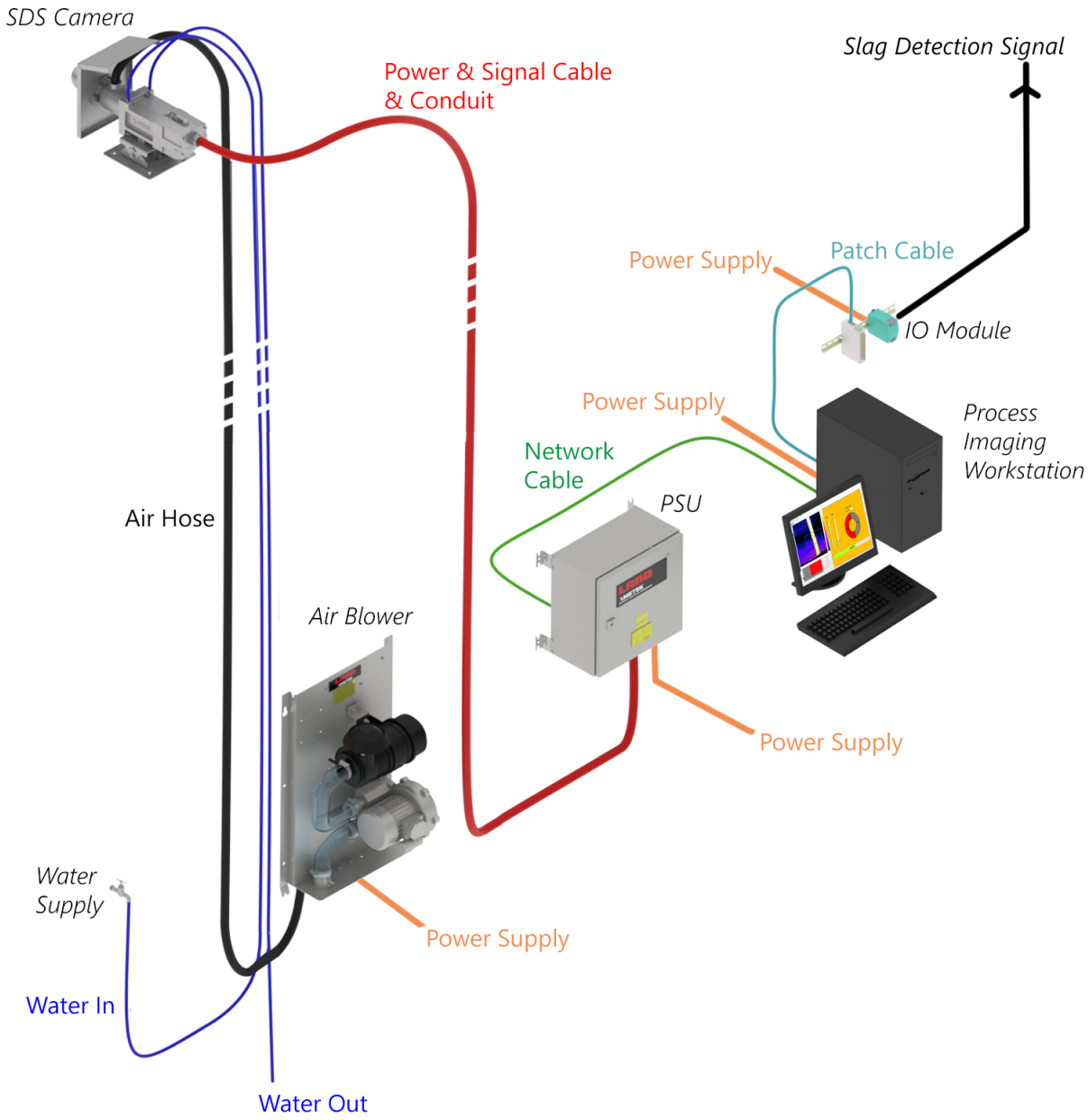
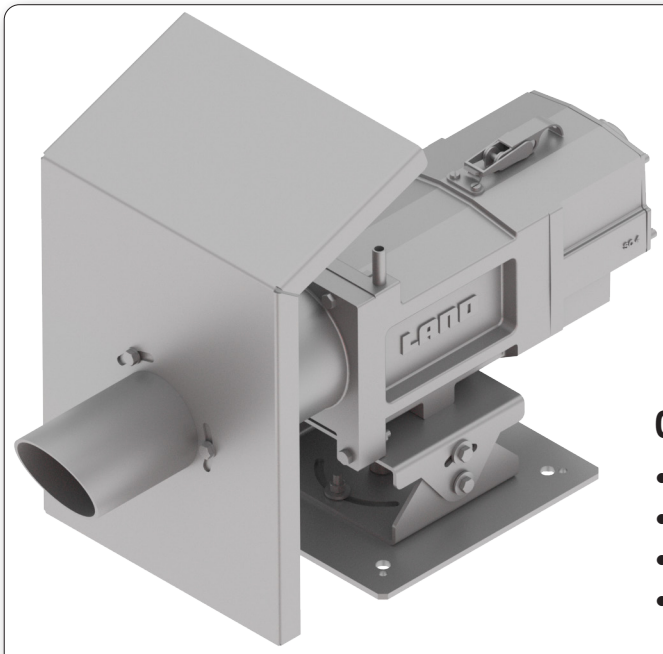



Fig. 2-1 SDS System Overview

# 3 SYSTEM COMPONENTS

## 3.1 SDS Camera



### Components

- SDS-640 Camera
- SDS-640 Pan & Tilt Assembly
- SDS-640 Protection Plate
- Air Purge, Water Jacket & Back Cap

Fig. 3-1 SDS Camera

### Specifications

| | |
|---|---|
| Measurement Range | 800 to 1800 °C / 1472 to 3271 °F |
| Image Resolution | 640 x 480 pixels |
| Field of View | 12° x 9° / 43° x 33° |
| Motorised Focus Range | 4 m to infinity / 13 ft 3 in to infinity |
| Temperature Resolution | 0.5 °C at 800 °C / 0.9 °F at 1472 °F |
| Accuracy | 2 % measured value |
| Protection Rating | IP65 |
| Services | Power & Signal Cable Conduit from PSU Module<br>Purge air from Air Blower<br>Cooling Water |
| Installation Dimensions | See Fig. 3-2 (overleaf) |

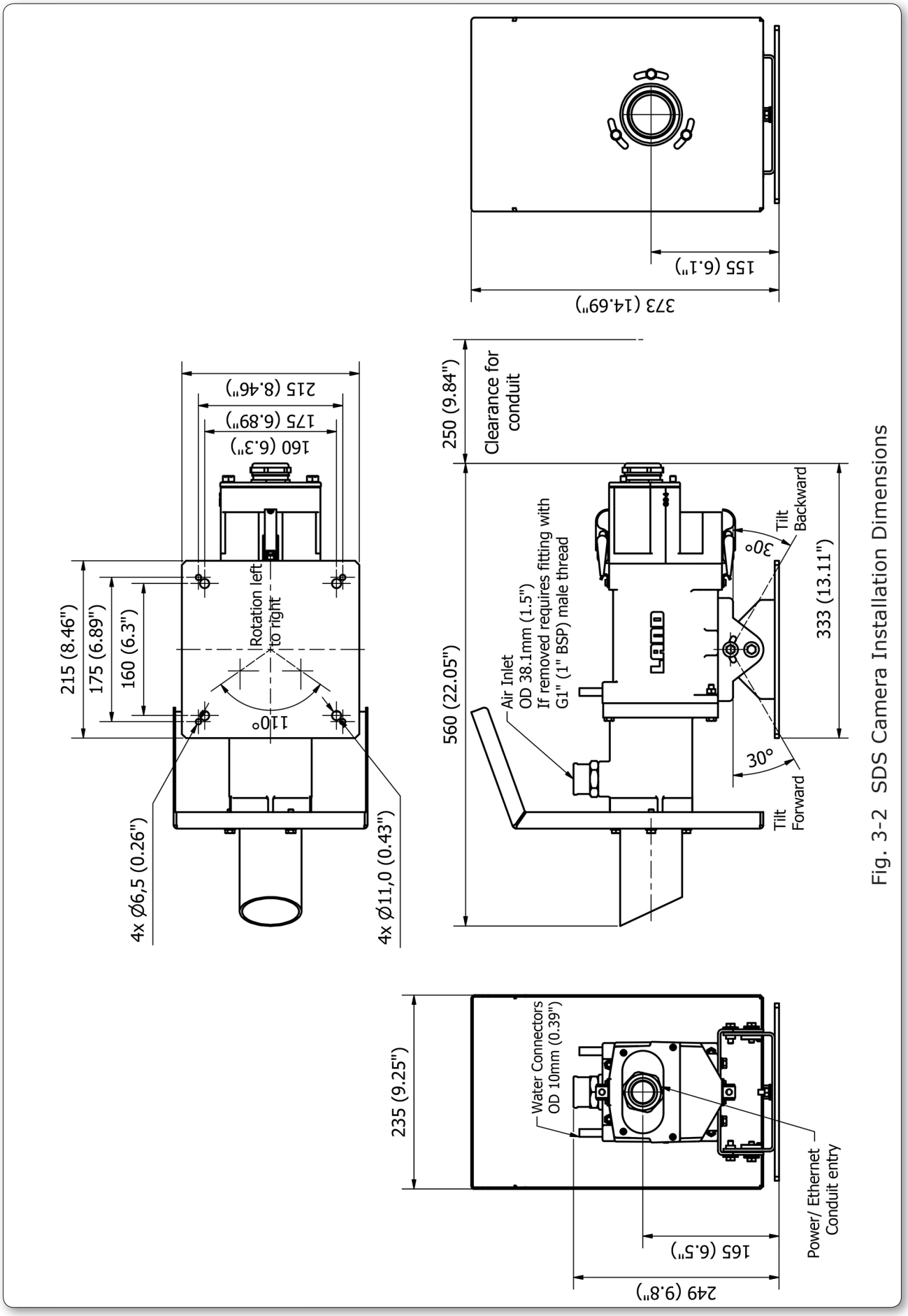
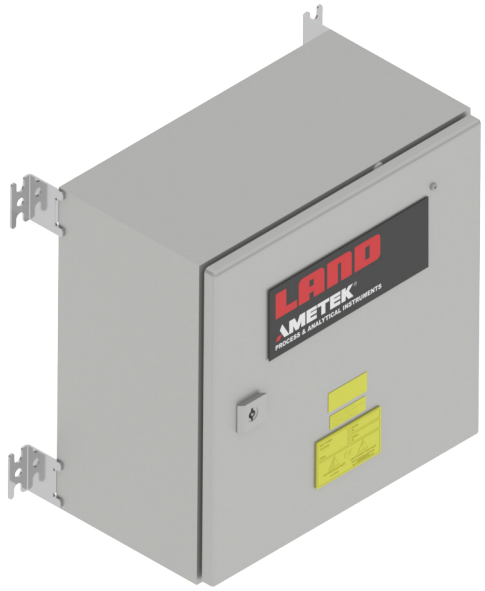



Fig. 3-2 SDS Camera Installation Dimensions

## 3.2 PSU Module




### Features

- Interface between SDS Camera and Image Processing Workstation
- UL Approved

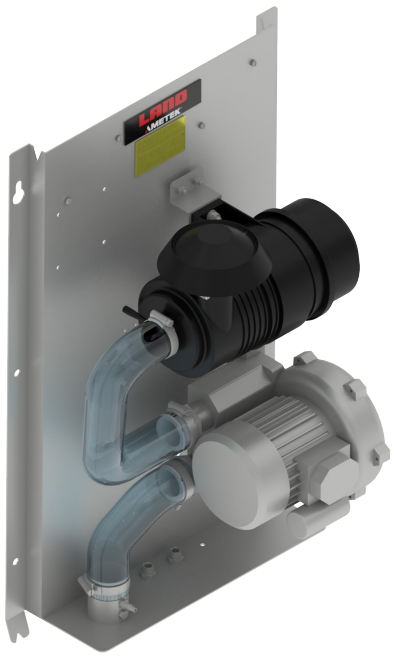
Fig. 3-3 SDS Power Supply Unit (PSU) Module

### Specifications

Refer to the SDS PSU (UL Approved) Installation Guide, Publication Nº 813482.

| | |
|---|---|
| Connections | AC Mains Power In<br>Power & Signal Cable Conduit to SDS Camera<br>Ethernet Cable to Process Imaging Workstation |

## 3.3 Air Blower




### Features

- Provides constant regulated air supply for SDS Camera purge

Fig. 3-5 AMETEK Land Plate Mounted Blower

### Specifications

Refer to the Plate Mounted Blower Installation Guide, Publication Nº 770-073.

| | |
|---|---|
| Weight | 21.5 kg / 47.3 lb without cover<br>32.8 kg / 72.2 lb with cover |
| Connections | AC Mains Power In*<br>38.1 mm / 1.5 in Air Hose to SDS Camera Purge |
| Maximum Ambient Temperature | 50 °C / 122 °F |
| Input Air Quality | Use only in locations where the incoming air is not corrosive, inflammable or explosive. |
| Installation Dimensions | See Fig. 3-6 |

* Choice of supply voltages available

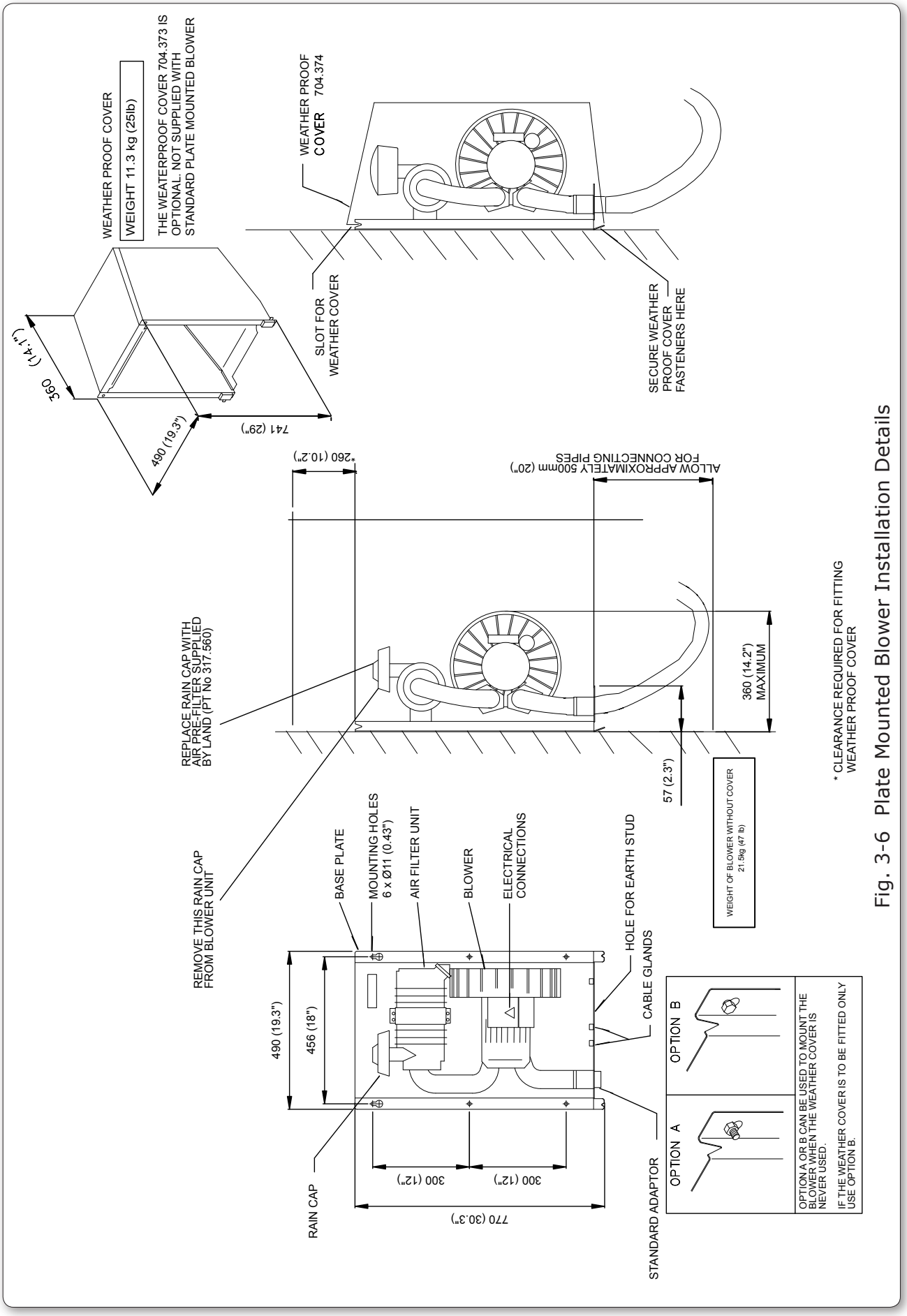



Fig. 3-6 Plate Mounted Blower Installation Details

## 3.4 Process Imaging Workstation

### Features

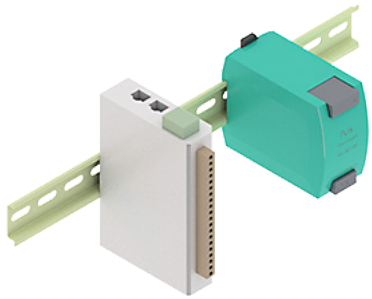
- SDS Server Software

Fig. 3-7 SDS Process Imaging Workstation

## Specifications

| | |
|---|---|
| Connections | AC Mains Power In<br>Ethernet Communications to SDS PSU Module and MOXA I/O |
| Temperature range | Operating 0 to 35 °C (32 to 95 °F)<br>Storage -40 to 65 °C (-40 to 149 °F) |
| Relative humidity (maximum) | 10 to 80 % (non-condensing) |

## 3.5 IO Module



### Features

- DIN Rail Mounted
- Must be installed inside an enclosure

Fig. 3-8 IO Module & PSU (DIN Rail mounted)

## Specifications - IO Module

| | |
|---|---|
| Mountings | DIN Rail |
| Connections | AC Mains Power In<br>Ethernet to Process Imaging Workstation |
| Breakdown Voltage | 500 VAC |
| Contact Current Rating Resistive load | 5 A @ 30 VDC, 250 VAC, 110 VAC |
| Contact Resistance | 100 milli-ohms (max.) |
| Initial Insulation Resistance | 1,000 mega-ohms (min.) @ 500 VDC |
| Dimensions | 27.8 x 124 x 84 mm / 1.09 x 4.88 x 3.31 in |
| Weight | 200 g / 0.44 lb |
| Wiring I/O cable | 16 to 26 AWG |
| Operating Temperature Standard Models | -10 to 60 °C (14 to 140 °F) |
| Storage Temperature (package included) | -40 to 85 °C (-40 to 185 °F)<br>**Note:** Ambient humidity must be non-condensing and remain between 5 and 95 %.<br>The relays may malfunction when operating in high condensation environments below 0 °C / 32 °F. |

## Specifications - IO Module Power Supply

| | |
|---|---|
| AC-Input Voltage | AC 100-240 V (-15%/+10%) |
| Input current | <0.6A (@ AC 100 V, 30 W Pout) |
| External Input Fuse Recommendation | Minimum B-10A / C-6A |
| Dimensions (WxHxD) | 45 x 75 x 91 mm / |
| Weight (excluding packing) | 230 g / 0.5 lb |
| Connector Size Range | Flexible cable 0.3 - 2.5 $mm^2$ (28-12 AWG)<br>Ferrules admissible |
| Operating Temperature Range | -10 to +70 °C / -14 to +158 °F |
| Storage & Transport Temperature Range | -25 to +85 °C / -13 to +185 °F |

# 4 CAMERA LOCATION

**WARNING**

Do not attempt to install the SDS Camera when molten metal is being poured in the vicinity.

**Camera location**

- Refer to Figs. 4-1 and 4-2
- Make sure that the SDS Camera has an unobstructed view of the target
- In the SDS software, make sure that the target is completely within the Field of View (FOV)

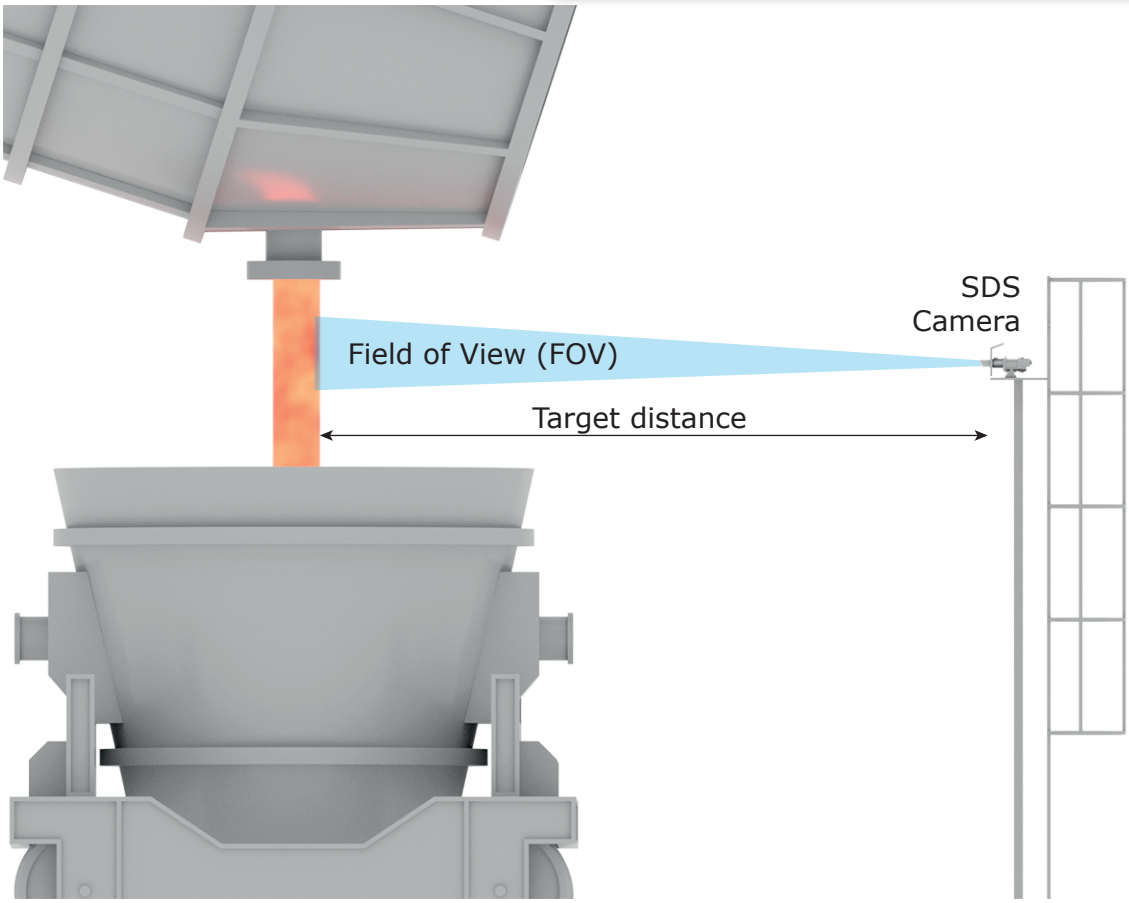
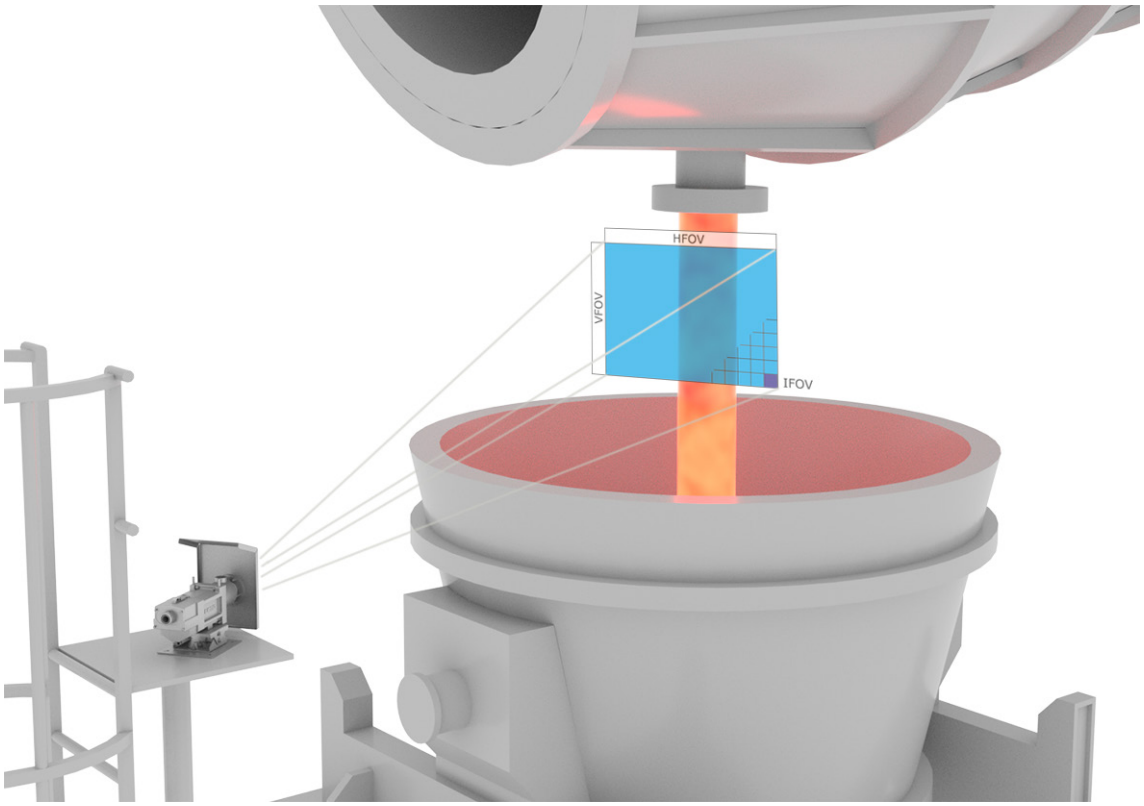



Fig. 4-1 SDS Camera Location and Target Distance




| | Distance 4 m | | |
|---|---|---|---|
| FOV | Width | Height | IFOV |
| 12° x 9° | 0.8 m | 0.6 m | 1.3 mm |
| 43° x 33° | 3.2 m | 2.4 m | 4.9 mm |
| | Distance 5 m | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 1.0 m | 0.7 m | 1.6 mm |
| 43° x 33° | 3.9 m | 2.9 m | 6.1 mm |
| | Distance 7.5 m | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 1.5 m | 1.1 m | 2.3 mm |
| 43° x 33° | 5.9 m | 4.4 m | 9.2 mm |
| | Distance 10 m | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 2.1 m | 1.5 m | 3.3 mm |
| 43° x 33° | 7.8 m | 5.9 m | 12.2 mm |
| | Distance 15 m | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 3.1 m | 2.3 m | 4.8 mm |
| 43° x 33° | 11.8 m | 8.8 m | 18.4 mm |

| | Distance 13.1 ft | | |
|---|---|---|---|
| FOV | Width | Height | IFOV |
| 12° x 9° | 33.1 in | 24.8 in | 0.05 in |
| 43° x 33° | 125.9 in | 94.5 in | 0.19 in |
| | Distance 16.4 ft | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 41.3 in | 30.7 in | 0.06 in |
| 43° x 33° | 153.5 in | 114.2 in | 0.24 in |
| | Distance 24.6 ft | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 61.8 in | 46.5 in | 0.09 in |
| 43° x 33° | 232.3 in | 173.2 in | 0.36 in |
| | Distance 32.8 ft | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 82.7 in | 61.8 in | 0.13 in |
| 43° x 33° | 307.1 in | 232.3 in | 0.48 in |
| | Distance 49.2 ft | | |
| FOV | Width | Height | IFOV |
| 12° x 9° | 124.0 in | 92.9 in | 0.19 in |
| 43° x 33° | 464.6 in | 346.5 in | 0.72 in |

Fig. 4-2 SDS Camera IFOV for various Target Distances

# 5 SYSTEM INTERCONNECTIONS

**WARNING**

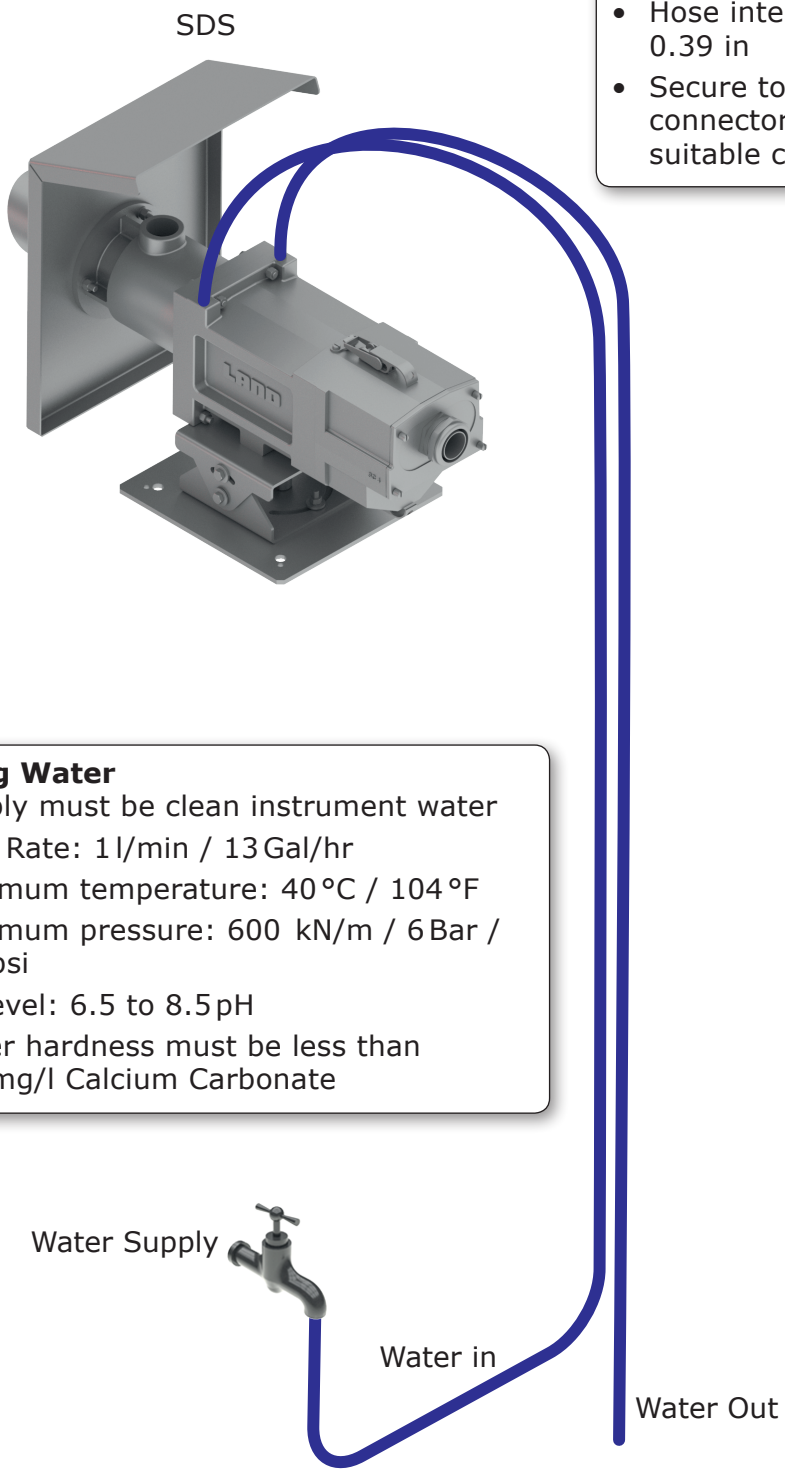
Do not attempt to install the SDS System when molten metal is being poured in the vicinity.

Make sure that the cooling water supply for the SDS protective jacket is installed and operating correctly **before** using the SDS in its chosen measurement location.

Check that the purge air supply for the SDS protective jacket is installed and operating correctly **before** using the SDS in its chosen measurement location.

## 5.1 Cooling Water Connections

**Water Hoses (Customer supplied)**
- Always use flexible hose to allow for pan & tilt
- Hose internal diameter: 10 mm / 0.39 in
- Secure to inlet and outlet connectors on SDS jacket with suitable clips

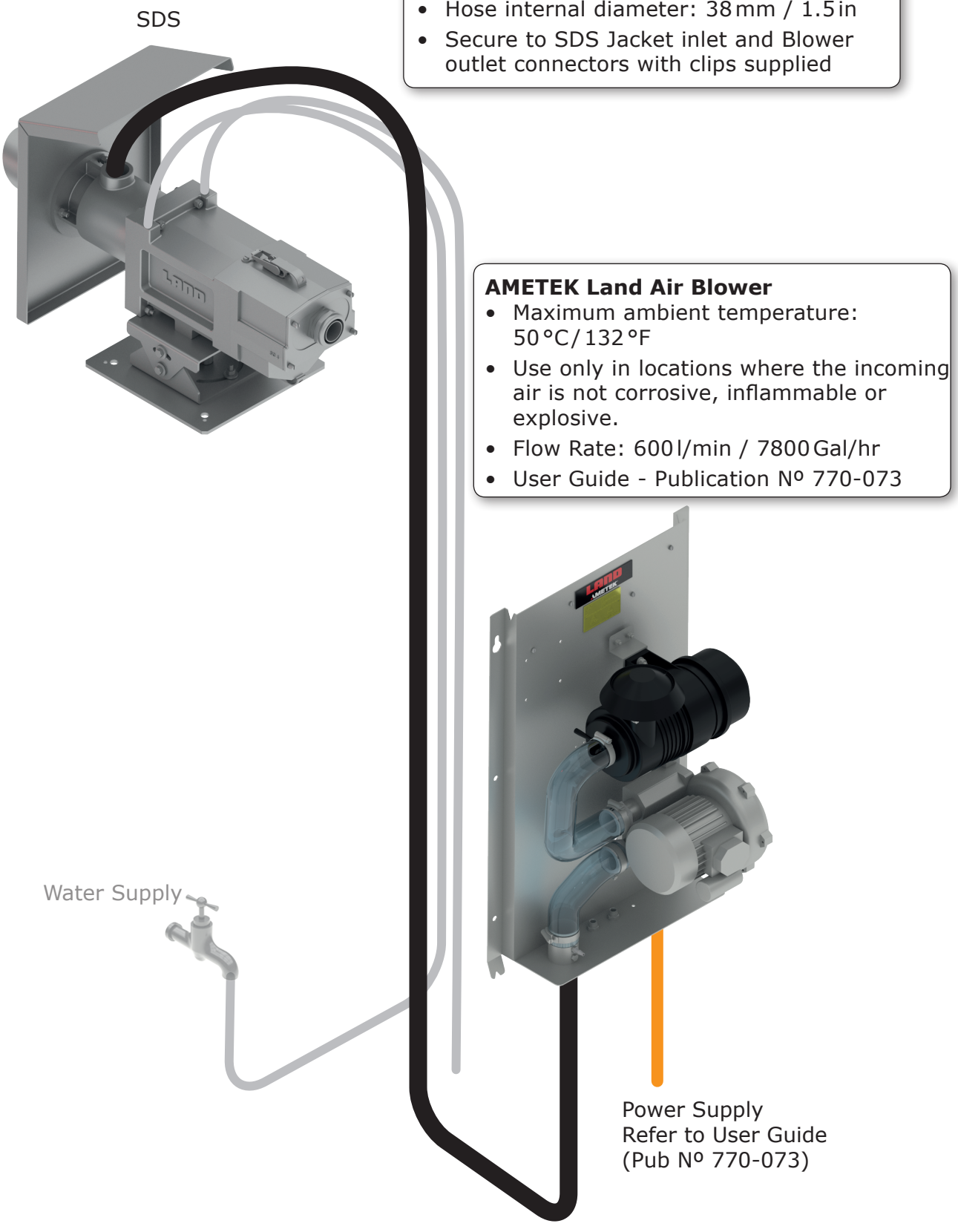



**Cooling Water**
- Supply must be clean instrument water
- Flow Rate: 1 l/min / 13 Gal/hr
- Maximum temperature: 40 °C / 104 °F
- Maximum pressure: 600 kN/m / 6 Bar / 100 psi
- pH level: 6.5 to 8.5 pH
- Water hardness must be less than 150 mg/l Calcium Carbonate

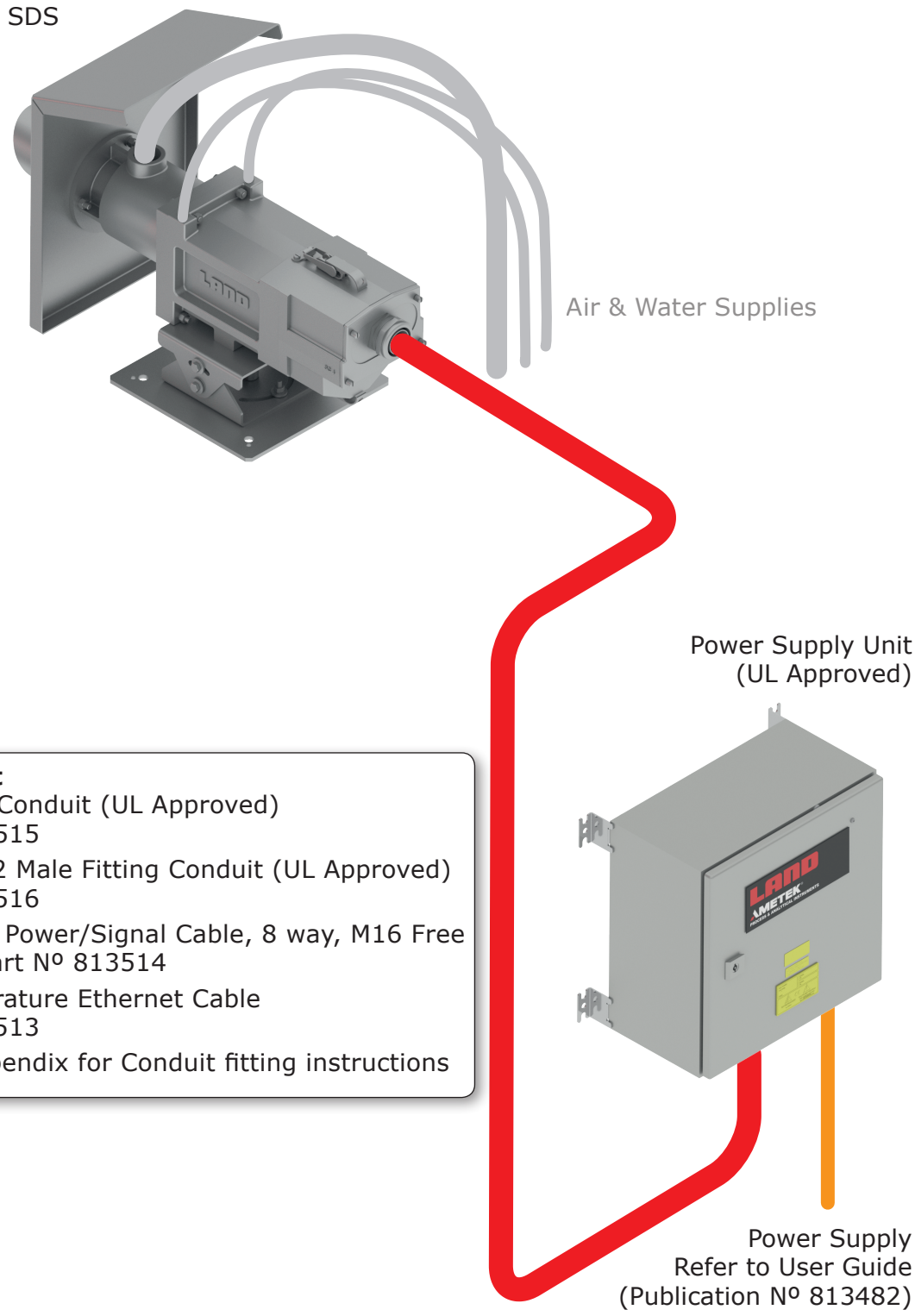
**Note:** Flow can be reversed

## 5.2 Purge Air Connections

**Air Hose (Supplied)**
- PVC Hose (Max length 30 m / 98 ft)
- Hose internal diameter: 38 mm / 1.5 in
- Secure to SDS Jacket inlet and Blower outlet connectors with clips supplied



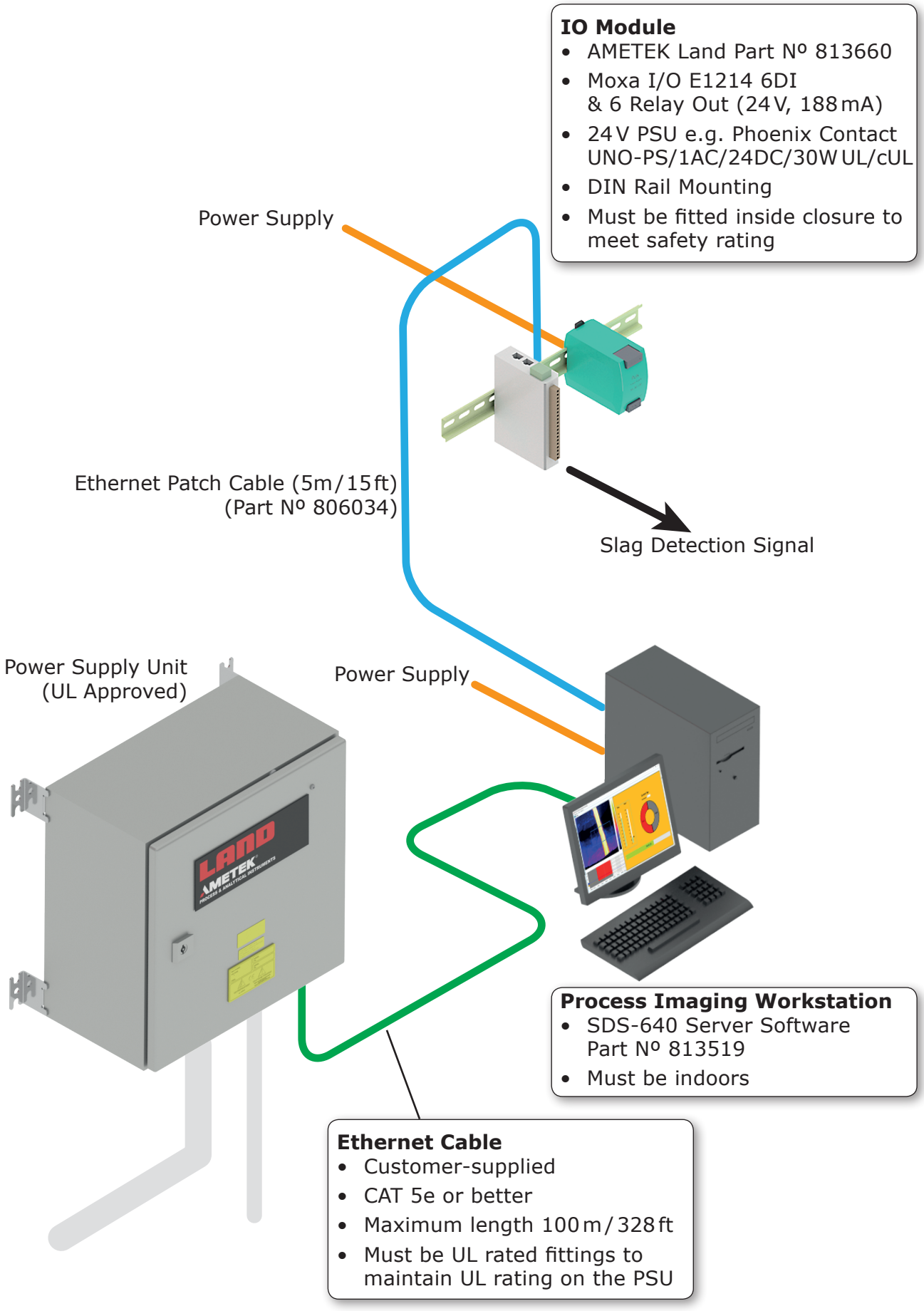
## 5.3 Power & Signal Connections




**Cable Conduit**

- 10 m / 30 ft Conduit (UL Approved)
  Part Nº 813515
- Straight M32 Male Fitting Conduit (UL Approved)
  Part Nº 813516
- 10 m / 30 ft Power/Signal Cable, 8 way, M16 Free 160degC. Part Nº 813514
- High Temperature Ethernet Cable
  Part Nº 813513
- Refer to Appendix for Conduit fitting instructions

## 5.4 Workstation Network Connections



# 6 SOFTWARE INSTALLATION

Refer to the IMAGEPro-SDS Software User Guide and Online Help.

# 7 MAINTENANCE

**It is recommended that the following are checked on a regular basis.**

- Check for loose wiring or any other damage to cables and/or conduits
- Check that the cooling water supply is within the recommended temperature and flow rate limits
- Check that the purge air supply is within the recommended temperature and flow rate limits.
- Clean external surfaces with a clean, damp cloth.

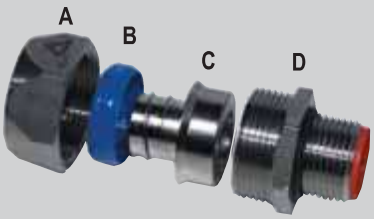
# 8

# SPARE PARTS

| Part Number | Description |
|---|---|
| 813451 | SDS 640 System (12° Field of View Camera) |
| 814846 | SDS 640 System (43° Field of View Camera) |
| 813216 | SDS-640 Camera (12° Field of View) |
| 814833 | SDS 640 Camera (43° Field of View) |
| 813472 | SDS 640 Pan & Tilt Assembly |
| 813477 | SDS 640 Back Cap Assembly |
| 813666 | SDS 640 Spare Protection Plate |
| 813478 | SDS-640 PSU Module (UL) |
| 813524 | SDS-640 Air Purge Assembly |
| 813517 | SDS 640 Rugged Enclosure |
| 813661 | SDS-640 Cable & Conduit Assembly |
| 813660 | SDS-640 System I/O |

# APPENDIX
# CONDUIT INSTRUCTIONS

## INSTALLATION INSTRUCTION ANACONDA FITTINGS




**For all types SEALTITE conduits (except CNP)**

The Anaconda fittings are easy to install.

Place the counter nut (part A) with the thread to the front over the conduit, place the plastic clamping ring (part B) over the conduit, turn the ferrule (part C) in the conduit (hand-tight), place the body (part D) and screw the counter nut hand-tight. Afterwards with a wrench 1 or 2 turns and the fitting is installed IP 67 liquid-tight.

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Continuous product development may make it necessary to change these details without notice.

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