



ViscoIndicator

Rheological sensing for the masses

Assembly, Installation & Service Manual



*From lab to production,
providing a window into the process*



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1 General

1.1 Important information about the use of this manual

This manual covers the Assembly, Installation and Service of the ViscoIndicator. The operation of the ViscoIndicator is covered in a separate manual (Dynisco p/n 974175).

2 Safety

All safety instructions must be heeded and observed. Non-observance of safety instructions may cause damage to life and health of persons, environmental damage and/or extensive damage to property.

Observing the safety instructions included in the operating instructions will help to avoid dangers, to operate the installation profitably and to secure the full use of the product.

2.1 Safety summary

The following are recommended safety precautions unrelated to any specific procedures in this manual and therefore do not appear elsewhere. Personnel must understand and apply them as appropriate during all phases of operation and maintenance. IN ALL CASES, BE PRUDENT.

Keep away from live circuits

Do not replace components or make adjustments inside equipment with power turned on. To avoid injuries, always remove power and discharge and ground a circuit before touching it. When making electrical connections, the services of a qualified electrician must be employed. Contact with live electrical circuits can cause serious personal injury or death. Be sure no circuits are energized during installation, connection or removal of any electrical cables or lines.

Examine the cabling and housings regularly for damage. Machines with damaged wiring or control systems must be disconnected from the power line immediately and must not be operated again until they have been repaired by qualified personnel.

Wear protective clothing

Wear protective clothing (gloves, apron, goggles, etc.) approved for the materials and tools being used.

Provide adequate ventilation

Provide ventilation to remove heat and noxious odors and to prevent the accumulation of asphyxiates such as nitrogen gas.

Avoid hot surfaces

Keep hands away from hot surfaces and materials. Contact with hot surfaces or materials can cause blistering and third degree burns. Wear approved, clean, thermally insulated gloves when handling these components. Should injury occur; immerse injured area in cold water and get immediate medical attention.

Avoid tipping the stand

After assembling the stand, install the RCU on the stand before installing the RSU. Installing the RSU to the stand before installing the RCU can make the stand unstable. Take care to follow this assembly order unless the stand has been properly secured.

The optional stand has flexible configuration capability. It is possible to configure it in such a way that it is unstable. Take care not to use it this way unless it is properly secured.

Take care to avoid tipping the stand due to an impact (from something/somebody running into the stand), or from a collision (a forklift or crane load, etc being driven into it), or while moving the stand. Do not climb on or support yourself with this stand. Use signs or barriers as appropriate.

When moving the stand around on its castors, there is danger that it could suddenly stop sharply when it rolls over uneven floor surfaces or other obstructions (screws, granules), and could tip. Appropriate caution must therefore be taken - roll the unit slowly!

The castors on the base of the stand must be examined regularly for damage and secure fit, damaged castors are to be replaced immediately.

2.2 Obligation of the operator to exercise due care

The Dynisco component conforms to the state of the art technology and ensures a maximum of safety. In practical operation, this safety can, however, be achieved only if all necessary measures are taken. The obligation of the plant operator to exercise due care includes planning these measures and supervising their execution.

Especially, the operator has to ensure that:

- The Dynisco component will be used only in accordance with the intended purpose.
- The Dynisco component will be operated in a flawless, functionally efficient condition and that, in particular, the functional efficiency of the safety devices will be checked at regular intervals.
- The necessary personal protective equipment for the operating, maintenance, and service personnel will be available and used by them.
- The operating instructions are always available completely and fully legibly at the installation location of the Dynisco component. It must be guaranteed that all persons who have to work with the Dynisco component can consult the operating instructions at any time.

- Only sufficiently qualified and authorized personnel will operate, maintain, and repair the Dynisco component.
- Instructions concerning all relevant questions of industrial safety and environmental protection will regularly be given to the personnel, and that these persons will know and understand the operating instructions and, particularly, the safety instructions contained.
- All safety and warning instructions, attached to the Dynisco component, will not be removed and will remain fully legible.
- The service instructions in accordance with the industrial safety legislation and the ordinance for the use of work materials will have to be made available as a supplement to the operating instructions.

2.3 Obligation of the personnel to exercise due care

The ViscoIndicator melt rheometer may only be operated by persons trained, instructed and authorized to do so. These persons must know the operating instructions and act accordingly. The respective competences of the staff must be clearly determined.

The following work described in these instructions may be carried out by qualified persons only:

- Assembly
- Installation
- Operation
- Servicing

Especially, the staff has to ensure that:

- Inexperienced operating personnel should only work with the Dynisco component while directly monitored by an experienced person.
- All persons operating and maintaining the Dynisco component must read the operating instructions and confirm by their signature that they understood the operating instructions.
- Unauthorized persons do not stay in the working area of the Dynisco component.



- The working area will be left only if all movable parts have come to a stop after having switched off the Dynisco component.
- In addition to the operating instructions, the service instructions within the meaning of the industrial safety legislation and the ordinance for the use of work materials will be observed.
- In case of malfunctions, the operator or the supervisors will be informed.
- The necessary personal protective equipment for the operating, maintenance, and service personnel will be used.

3 Transportation, handling, storage

3.1 System Description

3.2 Transportation

The machine is usually placed on a palette or inside a card board box for shipping. The dimensions ensure that no damage can occur under normal shipping conditions. The ViscoIndicator is wrapped in plastic sheeting for transportation – for overseas transport the palette is covered in addition with a suitable wooden or a cardboard box.

Because of the low weight of the ViscoIndicator the machine can be removed manually from the palette or the card board box.

When moving the ViscoIndicator mounted in the optional stand on castors, watch out for unevenness and obstacles on the floor. Sudden stops can cause the machine to tip over!

3.3 Inspection upon receipt

Check the delivery for completeness and signs of shipping damage. Any shipping damages must be sent to the shipping carrier and Dynisco in writing.

Immediately submit any claims in writing to the following address:

For Americas and APAC:

Dynisco
38 Forge Parkway
Franklin, MA 02038, USA
Fax: +1 508 541 6206

For EMEA:

Dynisco Europe GmbH
Pfaffenstrasse 21
74078 Heilbronn, Germany
Fax: +49 (7131) 297 166

3.4 Storage conditions

When intermediate storage is required upon delivery, be sure to:

- choose a dry room with a moderate temperature (approx. 18° C)
- leave the ViscoIndicator in the plastic sheeting
- avoid storing the ViscoIndicator outside. If this is inevitable, be sure to:
 - leave the ViscoIndicator in its original packaging
 - provide an additional rain cover for the ViscoIndicator
 - repair any defective paint work immediately
 - position the ViscoIndicator on squared timber or a palette.

As a rule, damages caused by inadequate storage will void any claims under the warranty

3.5 What's in the boxes

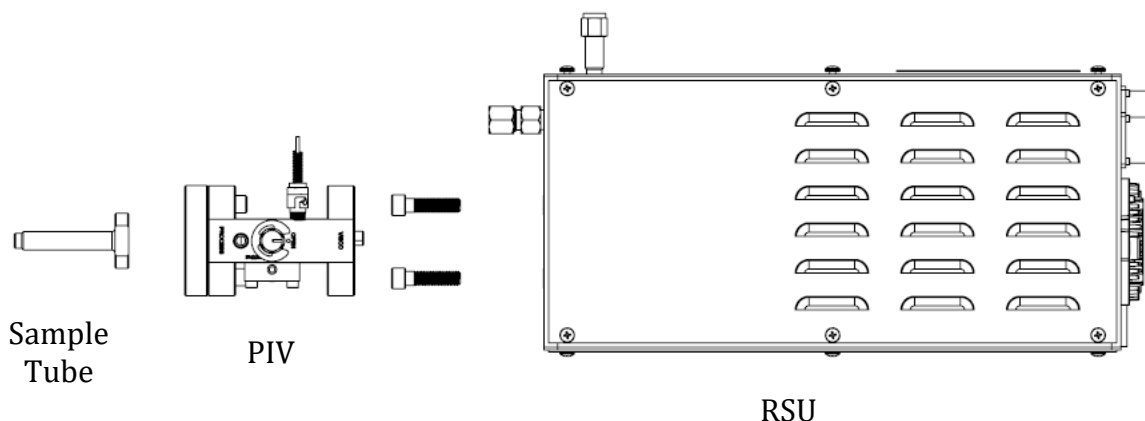
The **ViscoIndicator** provides continuous measurements of the melt flow rate, apparent viscosity, or intrinsic viscosity directly on the extruder.

The ViscoIndicator consists of the following:

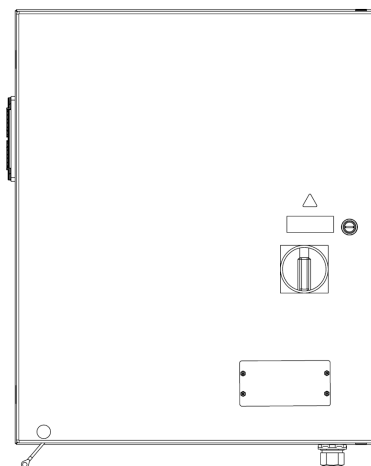
A **sample tube** that transfers polymer from the process to the ViscoIndicator for measurement.

The **Process Isolation Valve (PIV)** allows the flow of polymer to the ViscoIndicator to be shut off, allows purging, and allows a pressure transducer measurement on the process line.

A **Rheological Sensing Unit (RSU)** that measures the properties of the resin. It can be mounted on extruders, reactors, or molten polymer transfer lines in various orientations.



A **Rheological Control Unit (RCU)** that controls the measurement parameters of the RSU (temperature, pressure, flow rate), and communicates to an HMI.



RCU

The **Human Machine Interface (HMI)** remotely manages test parameters and provides measured and computed material properties. It provides rheological data similar to a Laboratory Capillary Rheometer or MFI readings similar to a Melt Flow Indexer.



HMI

Because of the system options available, please refer to the purchase order for the particular configuration and accessories. However, the following items are part of the standard ViscoIndicator:

ViscoIndicator Cable Bundle: These are the cables that connect the RCU to the RSU and HMI.

Additional Items:

Orifices

Orifice removal tool

Optional Items:
Vortex cooler
Stand



4 Assembly

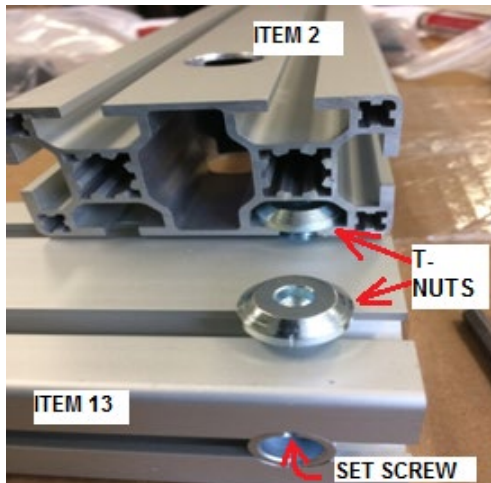
4.1 Assemble IRCU-STAND (optional)

If the optional IRCU-STAND has been purchased, the locations for mounting the RSU, RCU, and HMI have been predetermined. Assemble the stand per the instructions below. If this stand was not purchased, skip to section 3.2.

NOTE: Item numbers refer the numbers on drawing IRCU-STAND (included at the end of this section), unless noted.

4.1.1 Assemble Base

- Loosen the four connector set screws on the cross brace extrusion (item 13 - QTY 1)



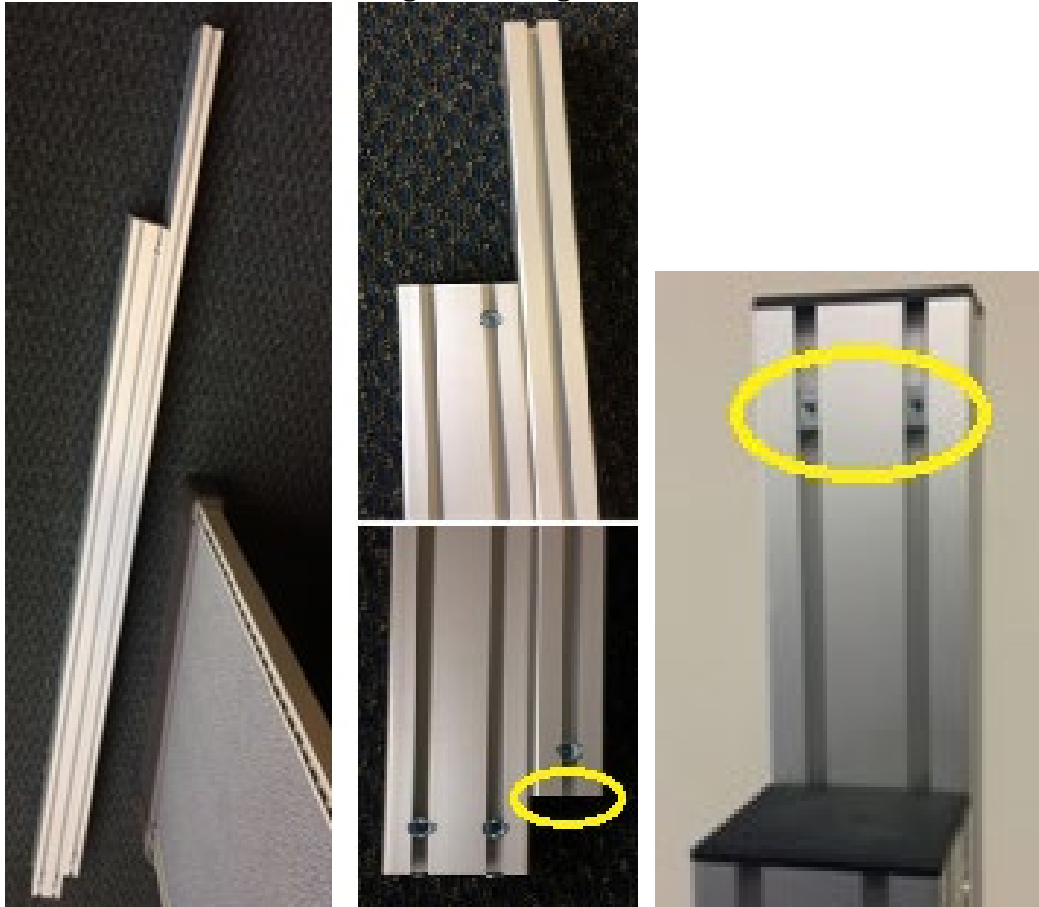
- On each end of item 13, slide one caster extrusion (item 2 - QTY 2) onto the T nuts
- The two T nuts on each end of item 13 slide into one slot of item 2.
- Center and position each item 2 perpendicular to item 13



- Tighten all four connector set screws on item 13

4.1.2 Assemble Mast

- Loosen the two connector set screws on the rectangular mast (item 3 - QTY 1)
- Loosen the two connector set screws on the square mast (item 1 - QTY 1)
- Slide the two masts together using the T nuts on each mast



- Tighten all four connector set screws on the masts
- Insert two M5 T-nuts (item 17) into upper end of item 3
- Attach endcap to lower end of item 3

4.1.3 Assemble Base to Mast

- Loosen the four connector set screws on the lower end of item 1
- Slide the four T-nuts on the lower end of item 1 into two slots of item 13, orienting the mast assy as shown



- Position item 1 approximately in the center of item 13
- Tighten the four connector set screws on the lower end of item 1

CAUTION: The positioning of the mast to the base described above may not provide the most stable configuration when an RSU is later mounted to the stand. Repositioning the mast relative to the base may provide additional stability (installation specific).

4.1.4 Assemble and attach RSU support to mast

- Loosen the four connector set screws at each end of item 12 (QTY 1)
- Slide two t-nuts on one end of item 12 into end of item 11 (QTY 1) without connectors



- Tighten two connector set screws of item 12
- Slide the RSU support onto item 3

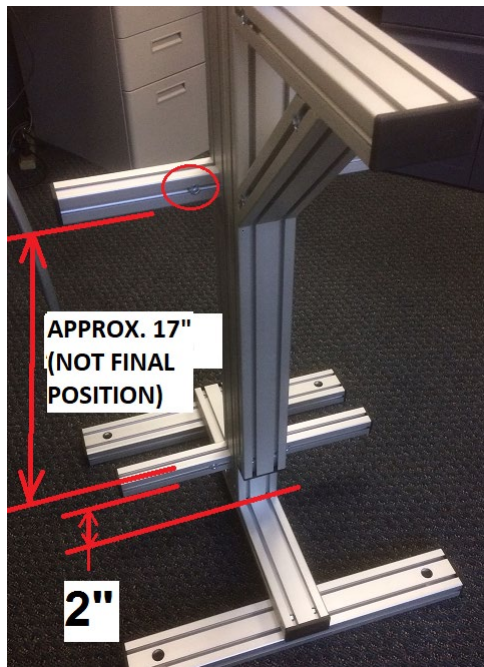


- Tighten the two connector set screws of item 11 for the desired height of the ViscoIndicator RSU
- Loosen the connection between items 11 and 12, and move item 12 to make both ends of item 12 flush to items 11 and 3
- Tighten all four connector set screws of item 12
-

CAUTION: The higher the RSU support on the mast the greater the instability. Position the RSU support as low as possible (installation specific).

4.1.5 Install RCU cabinet support arms

- Loosen the connector set screws on the cabinet support arms (item 6 - QTY 4)
- Attach each item 6 onto item 1 as shown;
- use farthest slot from the RSU support



- position the connector set screws facing the RSU support (red circle)
- position the two lower arms 2in from item 13
- position the two upper arms approximately 17in from the lower arms (the top arms will be moved to a final position later)
- Install one M5 T-nut (item 17) into each item 6 in the slot opposite the connector set screw slot (yellow circles)

CAUTION: Raising the position of the cabinet support arms will increase stand instability.

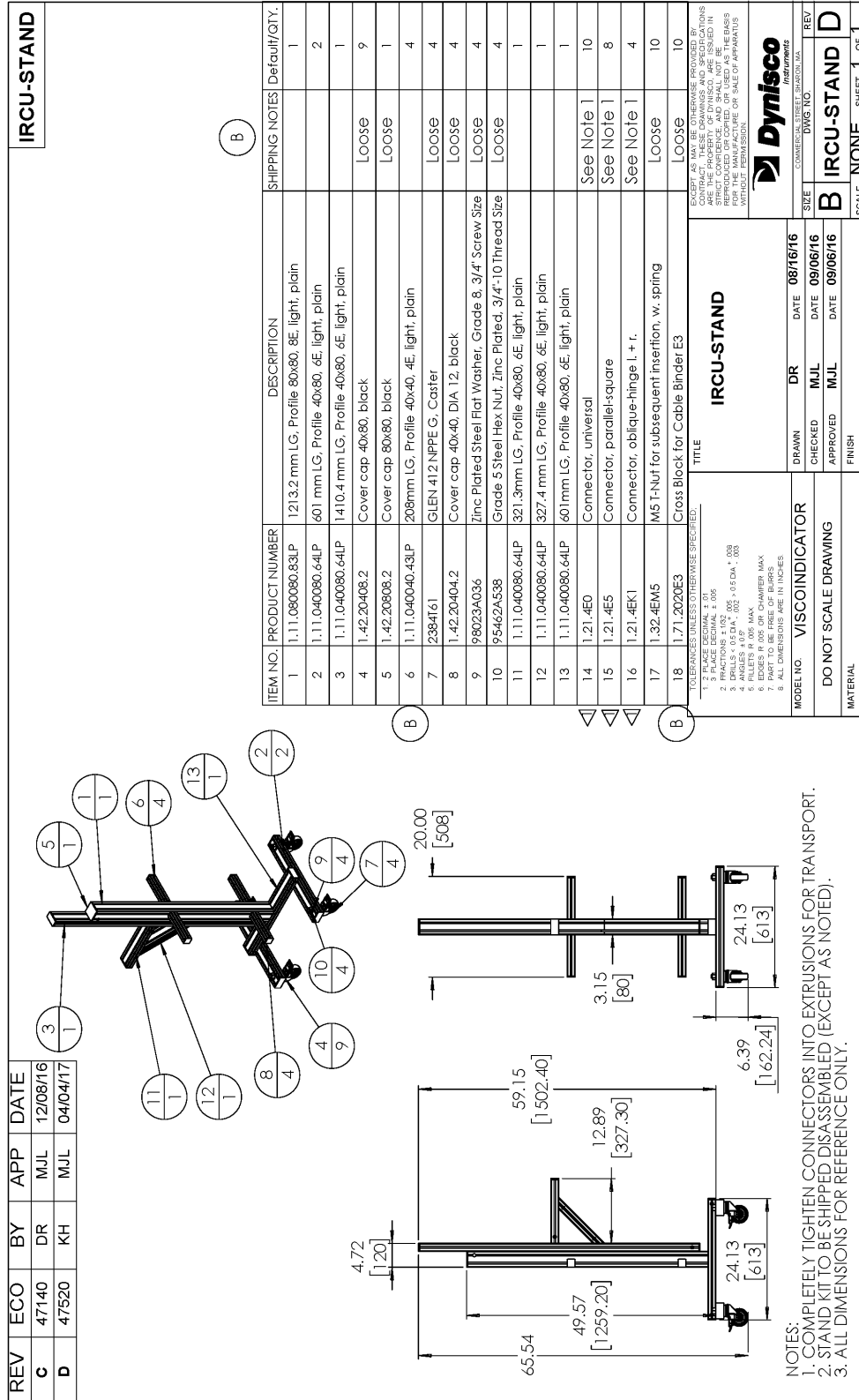
4.1.6 Install Casters

- Install four casters (item 7 - QTY 4) into two pcs of item 2
- Place a washer (item 9 - QTY 4) over each threaded caster shaft onto item 2
- Thread a nut (item 10 - QTY 4) onto each threaded caster shaft and tighten until caster is secure



4.1.7 Install Endcaps

- Press cover endcaps into extrusion ends:
- item 5 - QTY 1 - install on top end of item 1
- item 8 - QTY 4 - install on exposed ends of item 6
- item 4 - QTY 9 - install on all remaining exposed ends



4.2 Mount RCU to the stand

WARNING: It is recommended to install the RCU on the stand before installing the RSU. Installing the RSU to the stand before installing the RCU will tend to make the stand more unstable.

NOTE: Item numbers refer to drawing IRCU-STAND (included at the end of the previous section), unless noted.

NOTE: Dynisco P/N 1016335 consists of two parts; a lower and upper bracket.

4.2.1 Attach lower brackets to the stand

- Center and attach one lower bracket (part of Dynisco P/N 1016335) to the upper cabinet support arms using two M5 x 12mm long button head cap screws (Dynisco P/N 550186).
- Put the two screws through the holes nearest the ends of the bracket, and then thread the screws into the M5 T-nuts (item 17) located in the slots of item 6

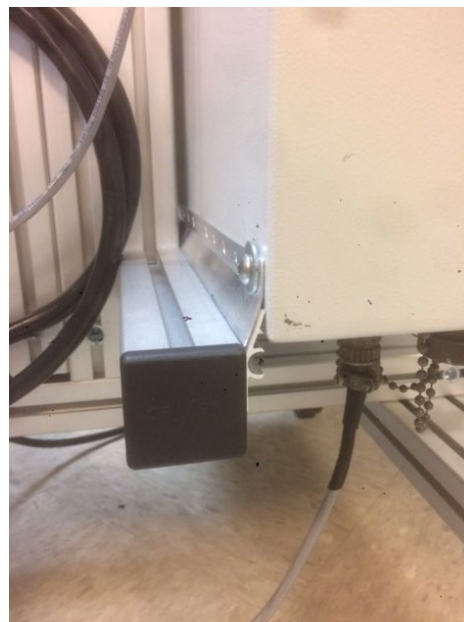
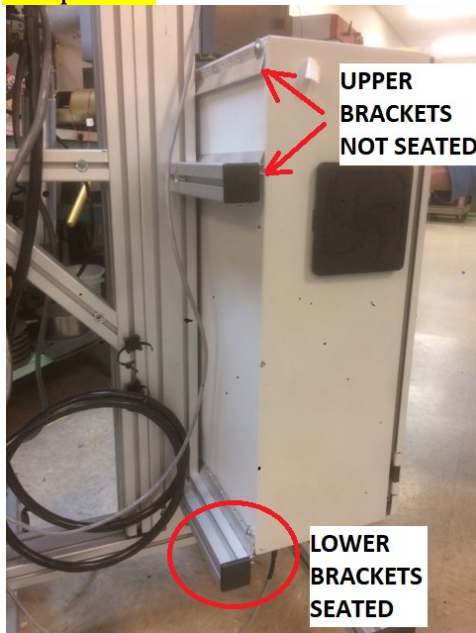


- Attach a second lower bracket to the lower cabinet support arms, as described above.

4.2.2 Attach the bottom of the RCU to the lowest bracket on the stand

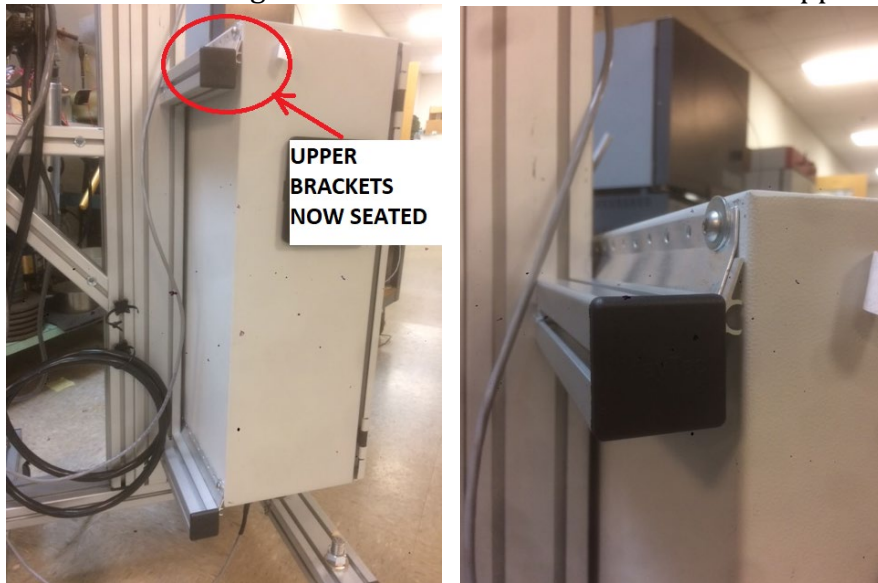
CAUTION: The RCU is heavy (20+ lbs). It is recommended that two physically capable people lift the RCU carefully to install it on the stand in a controlled fashion.

- Center and attach the bottom of the RCU to the lowest bracket of the stand by centering the RCU on the mast, then bringing the RCU down until the lower bracket seats (red circle)
- The RCU is not fully attached! Hold the RCU up against the mast until the next step is completed!



4.2.3 Attach the top of the RCU to the upper bracket on the stand

- While one person continues to hold the RCU against the mast, another person loosens then slides the upper stand bracket upwards until it seats in the upper RCU bracket. Tighten the two M5 screws to secure the upper stand bracket in place.



4.3 Attach the RSU (Head) to the stand

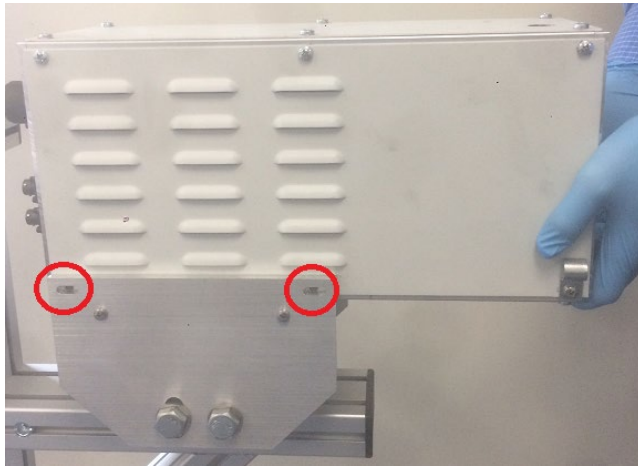
NOTE: Item numbers in this section refer to item numbers on drawing IRSU-MOUNT (included at the end of this section), unless noted.

4.3.1 Remove the IRSU-MOUNT from the RSU

CAUTION: The following step requires two people.

CAUTION: The RSU/PIV/IRSU-MOUNT weighs approx.40 lbs. Only physically capable personnel should lift this assembly.

- Remove the RSU/PIV/IRSU-MOUNT assembly from the shipping box, and carefully rest it on a surface using the bottom of the IRSU-MOUNT while continuing to support the assembly so it does not tip over.
- A second person should now detach the RSU/PIV assy from the IRSU-MOUNT by removing the four screws (2 screws on a side) holding the RSU to the IRSU-MOUNT (red circles)



- Place the RSU/PIV assy on a stable surface.

4.3.2 Attach the IRSU-MOUNT to the stand

- Install two M8 T-nuts (item 8 - QTY 2) into the upper slots of item 11 of drawing IRCU-STAND (yellow circle)



- Position the IRSU-MOUNT on top of the inserted M8 T nuts, so the thru holes in item 6 are as close as possible to the mast (red circle)



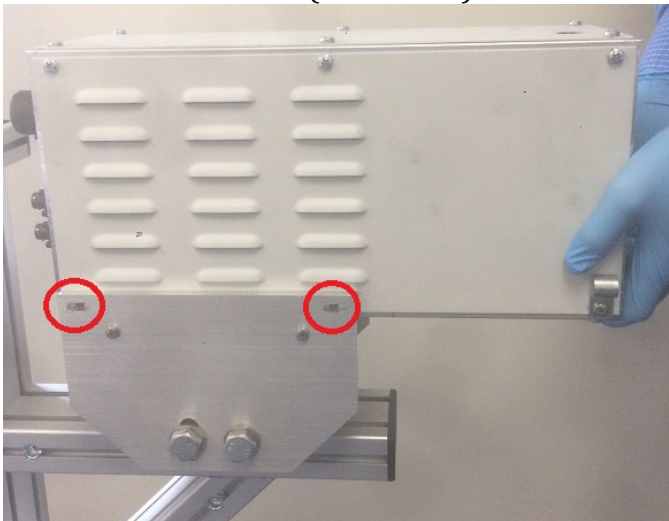
- Slide two M8 bolts (item 7 - QTY 2) thru the two holes in item 6, and into the two M8 T-nuts and begin to tighten
- Slide the IRSU-MOUNT on the RSU support to the desired position and then fully tighten the two M8 bolts



CAUTION: Increasing the distance between the IRSU-MOUNT and the mast increases the stand instability.

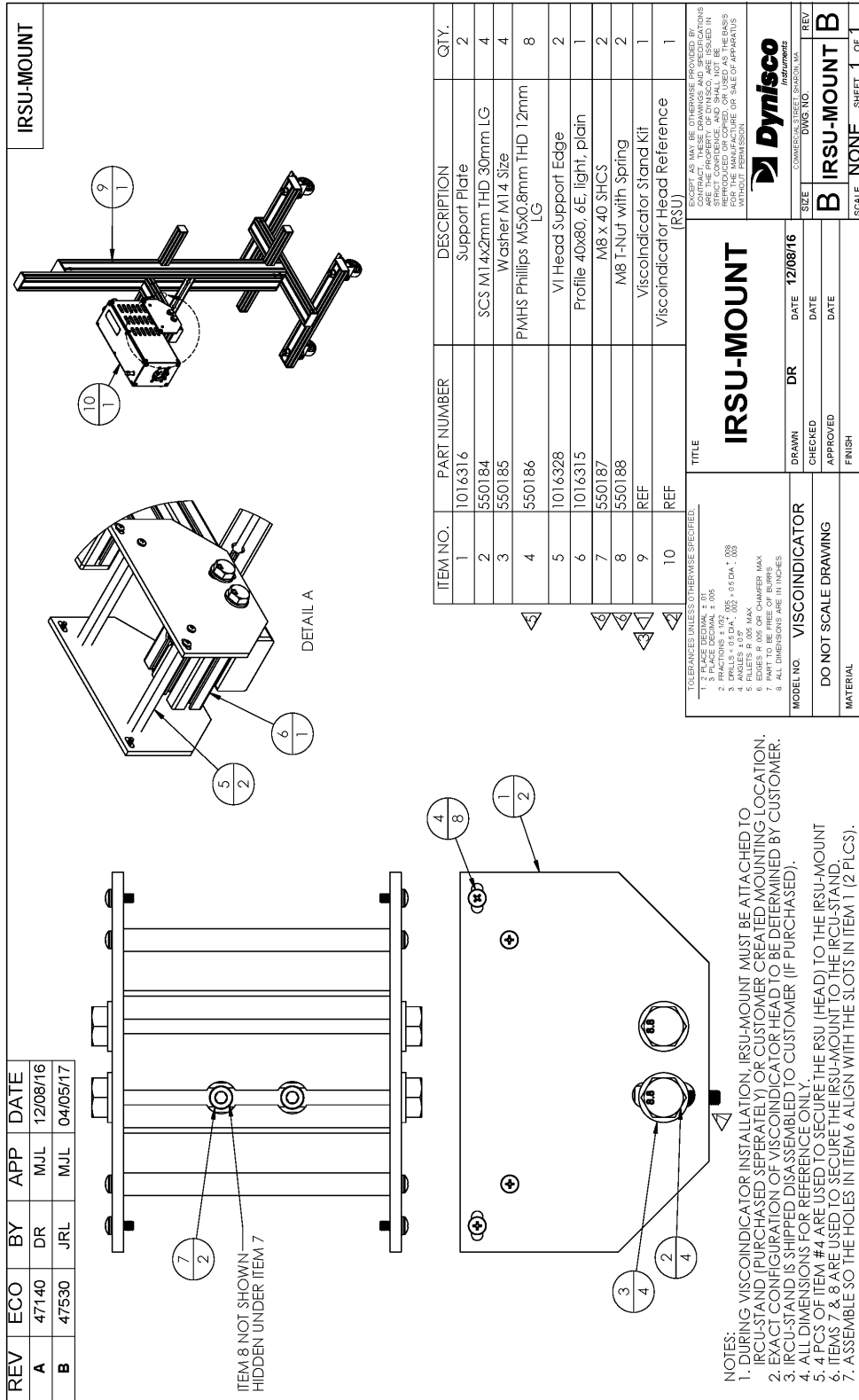
4.3.3 Attach the RSU to the IRSU-MOUNT

- Place the RSU onto the IRSU-MOUNT and line up the RSU cover screw holes with the holes in item 1 (red circles). **Continue to support the RSU so it will not fall over.**



- Reinsert the four pcs of item 4 into the holes in item 1, and tighten the 4 screws into the capture nuts in the RSU to secure the RSU





4.4 Attach the HMI to the stand

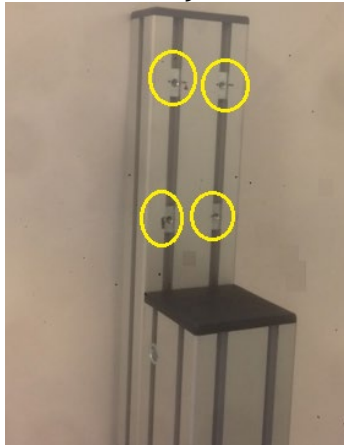
The HMI consists of a capacitive touchpanel mounted into a metal box.

The touchpanel electronics must be mounted in a dry location that does not exceed 50C.

Item numbers refer to ViscoIndicator Stand Drawing (IRCU-STAND) in section 4.1.

4.4.1 Insert M5 T-Nuts

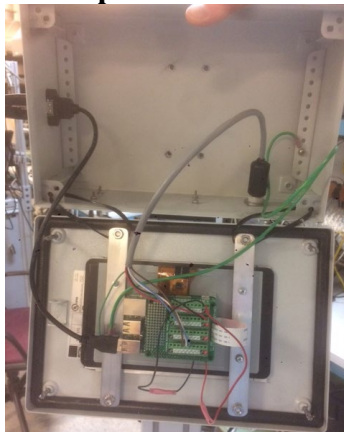
- Position four M5 T-Nuts (item 17) into 2 slots towards the top end of item 3 (yellow circles)



4.4.2 Place HMI on top of square post and open HMI box

- Place the HMI on top of the square post (item 1) against item 3
- Open the HMI box by unscrewing the 4 screws in the cover panel, being careful to hold the box and cover panel in place.

USE CAUTION FRAGILE: The cover panel is electrically attached to the box via a fragile wire so please be careful when handling it after unscrewing. Do not pull or stretch the electrical cable.



- Insert the four M5x20 BHCS screws supplied (Dynisco part number S0911) thru the drill holes in the back of the box so the screw line up with the T-nuts installed earlier in item 3.
- Secure the HMI box to item 3 by tightening the four M5 screws.
- Close the HMI box by putting the cover panel back on and screw the 4 original cover screws back in: **be careful to not pinch any wiring when closing the cover**

4.5 Install Vortex coolers into RSU & RCU (option)

4.5.1 Installing RSU Vortex cooler

- Install small 90degree pressure fitting into Vortex cooler port using teflon tape



- Remove plastic plug from RSU 90 degree cooler port (installed in back plate of RSU containing the box receptacles)
- Thread Vortex cooler into 90 degree port until fully seated



4.5.2 Install RCU enclosure Vortex cooler (system option)

- Install small 90degree pressure fitting into Vortex cooler port using teflon tape
- Remove plastic plug from RCU 90 degree cooler port (installed in side of RCU cabinet)
- Thread Vortex cooler into port until fully seated

4.6 Attach Vortex cooler regulators and tubing (option)

- Following instruction sheet that came with each regulator, install pressure gage and plug into each regulator body using teflon tape on the fitting threads.
- Mount regulator in convenient location (such as on the stand mast)
- Install air lines between each regulator output port and the Vortex cooler inlet port



4.7 Attach ViscoIndicator Cable Bundle: electrical cables between RSU, HMI to RCU

- Remove box receptacle covers if installed.
- Three cables go between the RSU and the RCU, and one cable goes between the HMI and RCU. All cable plugs can only mate with one specific box receptacle.
- Full thread/connect each cable plug into its respective box receptacle.

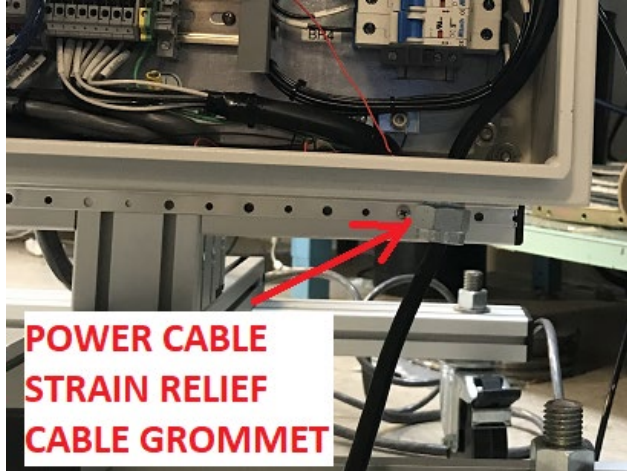
4.8 Attach RCU power cable to RCU

WARNING: Electrical wiring should only be performed by qualified licensed personnel

- Wire code compliant 240V electrical plug to power cable, or hardwire, as required.



- Feed power cable thru the cable grommet in the bottom right side of the RCU cabinet and clamp in place for strain relief



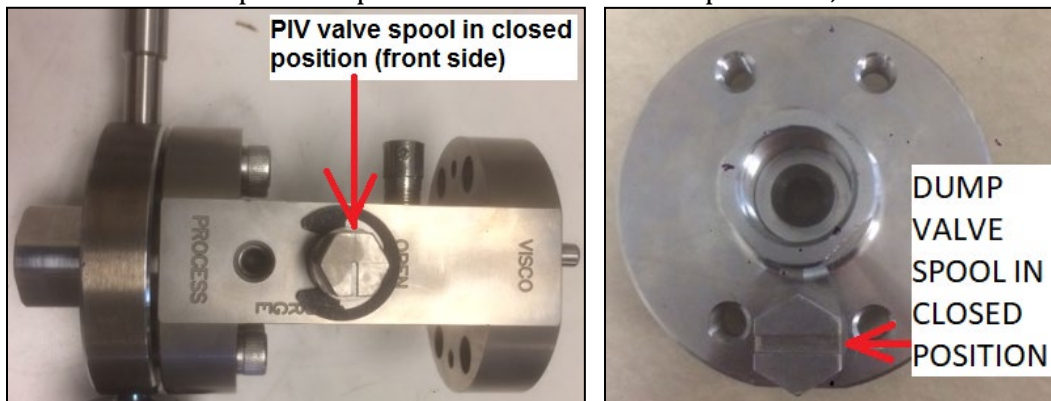
- Connect the ground wire to terminal 2 of terminal block 5 (TB5).
- Connect the line wire to terminal 2 of the ON/OFF switch (S1).
- Connect the neutral wire to terminal 4 of the ON/OFF switch (S1).
- Verify all connections are secure and tight.
- Verify all breakers are turned to the on position.
- Close and lock cabinet prior to turning on the system.

5 Installation

5.1 Process Connection Tie-in

The ViscoIndicator process connection consists of the supply tube, extension tube (optional), dump valve and PIV assy. Note this section is written describing the installation of a standard 1/2-20 thread 45° sealing surface supply tube with 90° extension tube, actual parts may vary. The process connection tie-in needs to occur before the ViscoIndicator system can be connected to the extruder.

The PIV and dump valve spools should be in closed positions, as shown below:



CAUTION: Installation of the process connection requires working in close proximity to hot extruder surfaces. Use appropriate heat protection clothing/gloves as needed to prevent injury.

5.1.1 Extruder at operating temperature but no pressure

- The process connection must be installed when the extruder is at operating temperature, with the extruder screw not rotating (no extruder pressure).

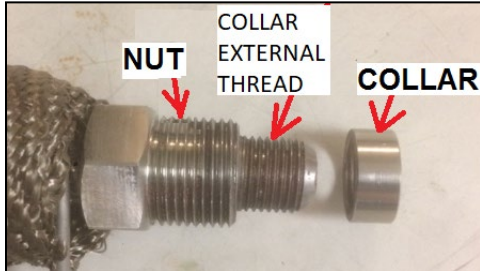
5.1.2 Remove port plug, pressure transducer, etc. if installed in the pressure port

5.1.3 Install supply tube after applying anti seize

- Apply anti-seize around the entire circumference of the 45° sealing surface (the angled surface at the end of the supply tube), and also to the first 4 or 5 external threads of the supply tube closest to the 45° sealing surface.
- Install supply tube hand tight into pressure port
- Tighten supply tube into pressure port using 1in wrench to 25 ft-lbs (42 ft-lbs max)

5.1.4 Install extension tube after applying anti seize

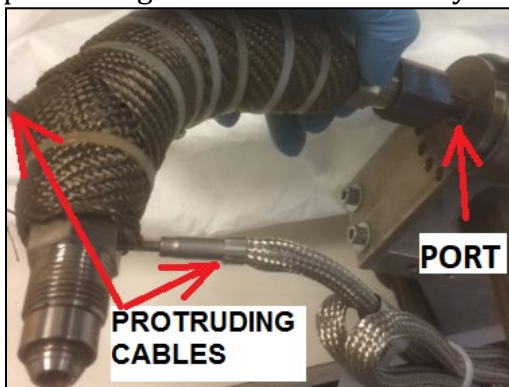
- Remove the collar from one end of the extension tube, then apply anti-seize to the extension tube external thread and the tube nut external thread



- Reinstall the collar onto the tube end by hand, fully threading the collar onto the tube **(1 to 2 full threads of the tubing must be exposed for proper installation)**



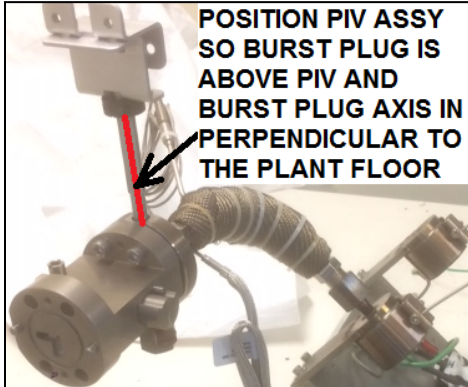
- Repeat this process for the other end of the extension tube
- Install the extension tube into the pressure port so the end of the tube with protruding cables is farthest away from the port.



- Install extension tube into supply tube by turning extension tube nut hand tight
- Tighten extension tube nut using 7/8 wrench to 25 ft-lbs (42 ft-lbs max)

5.1.5 Install PIV

- Install end of the PIV assy hand tight into the free end of the extension tube assy
- Install the PIV assy so the shaft of the burst plug is positioned above the PIV and pointing directly upwards



- Using a 1" wrench and a 7/8" wrench, tighten the extension tube nut into the PIV assy to 25 ft-lbs (42 ft-lbs max)

5.2 Connect VI system assy to Process Connection

NOTE: Item numbers in this section refer to item numbers on drawing PIV-I-HALF20 (included at the end of this section), unless noted.

5.2.1 Adjust RSU height/angle to match process connection height/angle

CAUTION: The following step requires two people.

CAUTION: The RSU/IRSU-MOUNT weighs approx.40 lbs. Only physically capable personnel should lift/support this assembly.

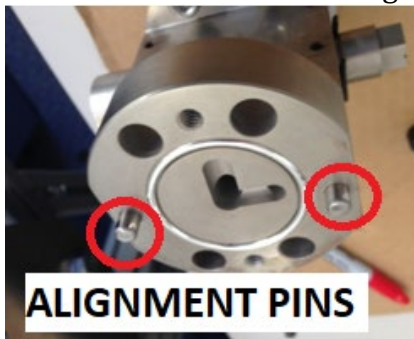
- Position the VI system up to the process connection, and note the alignment of the PIV to the RSU (head).
- Raise or lower the RSU as necessary to match the PIV alignment as follows:
- While one person supports the RSU/IRSU MOUNT, another person loosens the four M5 screws that support the RSU (red circles show 2 screws, other 2 screws are on the other side of the stand)



- The RSU angle can also be adjusted by loosening the four M14 bolts that are part of the IRSU-MOUNT (item 2 on IRSU-MOUNT drw).

5.2.2 Mate system to process connection

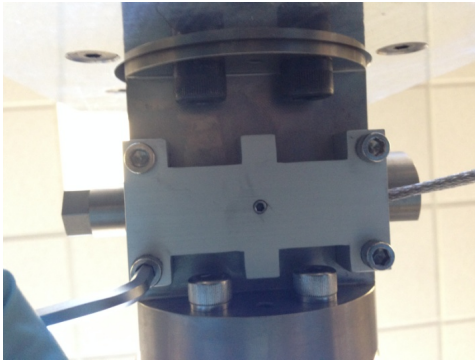
- Install a 1.7" diameter o-ring (item 8) into the PIV if not already installed. Apply anti-seize to the o-ring if it will not stay in the o-ring groove
- Connect the process connection to the RSU by mating the PIV to the flowblock; the PIV has two offset alignment pins that key into the flowblock surface (red circles).



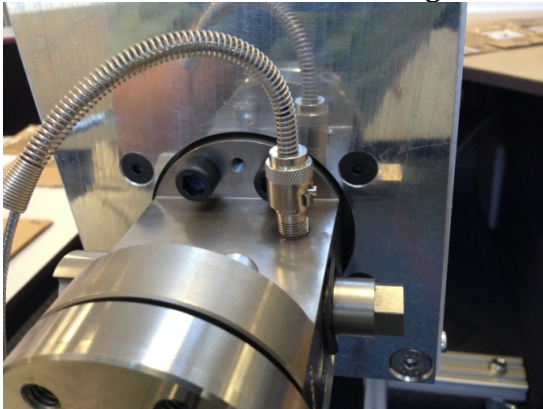
- Apply anti-seize to four SHCS 3/8"-16 x 1.5" lg, Dynisco p/n F714, and install screws to clamp the PIV to the flow block.

5.3 Install PIV heater and RTD

- Apply anti-seize to bayonet fitting threads (item 6) and install fitting into PIV
- Install heater block (item 4) using four screws (item 5) with anti-seize **NOTE: install heater block so small set screw (item 13) is accessible**
- Apply anti-seize to the heater cartridge (item 12) and secure in heater block thru hole using small set screw (item 13). Position heater length in middle of heater block thru hole.



- Install PIV spring loaded RTD (item 7) in the bayonet fitting:
 - Insert the PIV RTD into the bayonet fitting, aligning the slot in the PIV RTD fitting with the tab in the bayonet fitting
 - Continue pressing down on the RTD into the bayonet fitting and compress the RTD fitting spring until the bayonet tab is fully inserted into the RTD slot
 - Rotate the RTD fitting clockwise to locking it into the bayonet fitting tab.



REV	ECO	BY	APP	DATE
C	47741	MJL	MJL	06/02/17
D	47927	KH	MJL	07/19/17
E	48129	DE	MJL	8/28/17

SECTION A-A

NOTES:

- CAUTION! DO NOT TIGHTEN AND DO NOT CRUSH METAL O-RINGS DURING ASSEMBLY OR DURING SHIPMENT. METAL O-RINGS ARE SET AND CRUSHED IN PLACE BY CUSTOMER DURING INSTALLATION.
- ITEM 14 SHOWN FOR REFERENCE ONLY. SPECIFIC LENGTHS FOR ITEM 14 NEED TO BE DETERMINED PER CUSTOMER REQUIREMENTS AND OFFERED SEPARATELY.
- ITEM 15 IS A BAG OF EXTRA/SPARE O-RINGS & E-RING. KEEP BAG WITH COMPLETED PIV ASSEMBLY.
- "NO EXTENSION TUBE ASSEMBLY" CONNECTION SHOWN

CONNECTION TYPE	ITEM 11	ITEM 14
NO EXT. TUBE ASSY	9071-522	ASH-HALF20
EXTENSION TUBE	1012502	SEE DWG 1012000

TABLE 1

CONNECTION TYPE	ITEM 11	ITEM 14
NO EXT. TUBE ASSY	9071-522	ASH-HALF20
EXTENSION TUBE	1012502	SEE DWG 1012000

PIV-1-HALF20

NOTES:

- CAUTION! DO NOT TIGHTEN AND DO NOT CRUSH METAL O-RINGS DURING ASSEMBLY OR DURING SHIPMENT. METAL O-RINGS ARE SET AND CRUSHED IN PLACE BY CUSTOMER DURING INSTALLATION.
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- ITEM 15 IS A BAG OF EXTRA/SPARE O-RINGS & E-RING. KEEP BAG WITH COMPLETED PIV ASSEMBLY.
- "NO EXTENSION TUBE ASSEMBLY" CONNECTION SHOWN

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
17	711770	PIV Heat Plug PT06A-10-2P(SR)	1
16	711500	PIV RTD Plug PT06A-8-4P(SR)	1
15	PIV-HALF20-RINGKIT	RING-SPARE-KIT	1
14	REF	ANNUAL SUPPLY TUBE OR EXTENSION TUBE ASSY	1
13	S5848	SCREW, M4 X 5 LG HSSS FLAT PT, PLATED	1
12	9071-985	HEATER, CART, 240W, 300W, 1/4 DIA X 2 LG, 30IN LEAD	1
11	REF	EXTENSION CLAMP, VISCOSENSOR	1
10	9071-406	O-RING, METAL, .990	1
9	9960-7992	SCREW, 5/16-18 X 1-1/4 LG SHCS SS	4
8	9967-4569	O-RING, METAL, 1.738 OD	1
7	1016220	RTD, ADJUSTABLE	1
6	FV426076	BAYONNET ADAPTER	1
5	AS285	SCREW, 10-32 X 3/4 LG SHCS PLATED	4
4	9071-204	HEATER BLOCK	1
3	9967-4575	E-RING, .075	1
2	9071-791	O-RING, K-112, KYLON	2
1	1012501	ASSEMBLY, PURGE VALVE, 1/2-20 MOUNT	1

PIV ASSEMBLY COMPLETE, PURGE VALVE 1/2-20 MOUNT

MODEL NO. VISCOINDICATOR

DO NOT SCALE DRAWING

MATERIAL

TABLE 1

CONNECTION TYPE	ITEM 11	ITEM 14
NO EXT. TUBE ASSY	9071-522	ASH-HALF20
EXTENSION TUBE	1012502	SEE DWG 1012000

NOTES:

- CAUTION! DO NOT TIGHTEN AND DO NOT CRUSH METAL O-RINGS DURING ASSEMBLY OR DURING SHIPMENT. METAL O-RINGS ARE SET AND CRUSHED IN PLACE BY CUSTOMER DURING INSTALLATION.
- ITEM 14 SHOWN FOR REFERENCE ONLY. SPECIFIC LENGTHS FOR ITEM 14 NEED TO BE DETERMINED PER CUSTOMER REQUIREMENTS AND OFFERED SEPARATELY.
- ITEM 15 IS A BAG OF EXTRA/SPARE O-RINGS & E-RING. KEEP BAG WITH COMPLETED PIV ASSEMBLY.
- "NO EXTENSION TUBE ASSEMBLY" CONNECTION SHOWN

PIV-1-HALF20

NOTES:

- CAUTION! DO NOT TIGHTEN AND DO NOT CRUSH METAL O-RINGS DURING ASSEMBLY OR DURING SHIPMENT. METAL O-RINGS ARE SET AND CRUSHED IN PLACE BY CUSTOMER DURING INSTALLATION.
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
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14	REF	ANNUAL SUPPLY TUBE OR EXTENSION TUBE ASSY	1
13	S5848	SCREW, M4 X 5 LG HSSS FLAT PT, PLATED	1
12	9071-985	HEATER, CART, 240W, 300W, 1/4 DIA X 2 LG, 30IN LEAD	1
11	REF	EXTENSION CLAMP, VISCOSENSOR	1
10	9071-406	O-RING, METAL, .990	1
9	9960-7992	SCREW, 5/16-18 X 1-1/4 LG SHCS SS	4
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6	FV426076	BAYONNET ADAPTER	1
5	AS285	SCREW, 10-32 X 3/4 LG SHCS PLATED	4
4	9071-204	HEATER BLOCK	1
3	9967-4575	E-RING, .075	1
2	9071-791	O-RING, K-112, KYLON	2
1	1012501	ASSEMBLY, PURGE VALVE, 1/2-20 MOUNT	1

PIV ASSEMBLY COMPLETE, PURGE VALVE 1/2-20 MOUNT

MODEL NO. VISCOINDICATOR

DO NOT SCALE DRAWING

MATERIAL

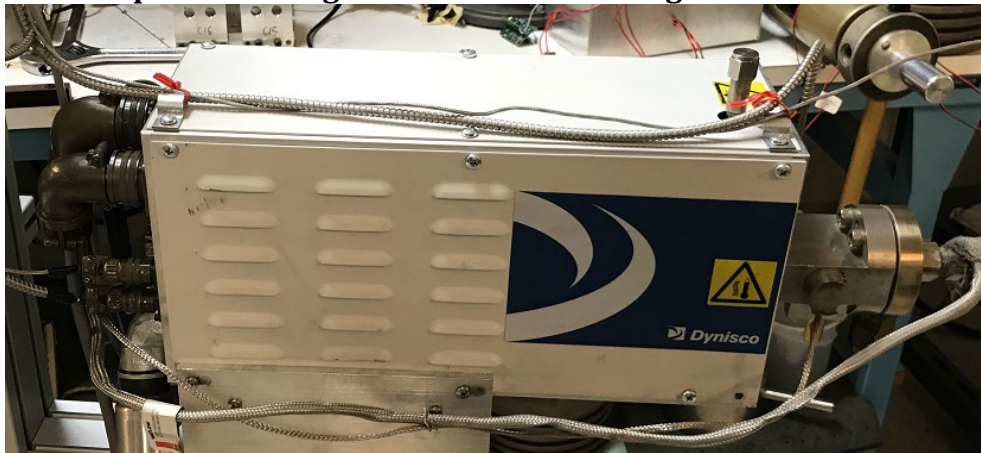
TABLE 1

CONNECTION TYPE	ITEM 11	ITEM 14
NO EXT. TUBE ASSY	9071-522	ASH-HALF20

5.4 Connect cables between process connection and RSU

- Connect the supply tube heater and RTD plugs (optional) and the ext. tube assy heater and RTD plugs (optional) to the back plate of the RSU
- Make sure to run all wiring on top of or to the side of the RSU.
- Secure all loose wiring to the top/side of the RSU using steel half clips (Dynisco p/n 550189) and zipties/buss wire or equivalent

Warning: Never run wiring under the RSU, as the wiring may become incased in plastic exiting the RSU die and damage the RSU



5.5 Connect airlines to Vortex regulators (option)

- Connect external airlines to Vortex regulator inlets

5.6 Insulate supply tube, ext. tube assy ends, dump valve and PIV

- It is recommended to wrap the supply tube, dump valve, and PIV in insulation as described below to improve ViscoIndicator temperature performance.
- The exposed extension tube assy ends should also be wrapped in insulation.
- High temperature insulation is required (fiberglass pipe insulation recommended)
- Flexible metal wire (Buss wire) can be wrapped around the insulation and then the ends of the wire twisted together to hold the insulation in place
- Make sure the PIV spool ends are accessible so the valve can be turned on and off
- Over the dump valve exit and spool, create a removable piece of insulation (a piece of fiberglass interwoven with a piece of buss wire, for instance). This piece of insulation will be removed when the dump valve is actuated.

5.7 Connect RCU cable to main line power

- Cable may also be hardwired per plant requirements

6 Mechanical/pneumatic parts - Operation

6.1 Vortex cooler

- The optional Vortex coolers create a positive pressure, cool air flow inside the RSU and RCU to keep the ViscoIndicator running under optimal conditions
- Each Vortex cooler should be fed clean filtered air at a minimum pressure of 30psi from the Dynisco supplied pressure regulator/filter (Dynisco p/n 9967-3759)
- Even when the ViscoIndicator isn't at temperature, it is preferred to keep the Vortex coolers on with air flowing to maintain a positive pressure air flow inside the RSU and RCU enclosures to limit the accumulation of dust/particulates in the enclosures

6.2 IRCU-STAND casters

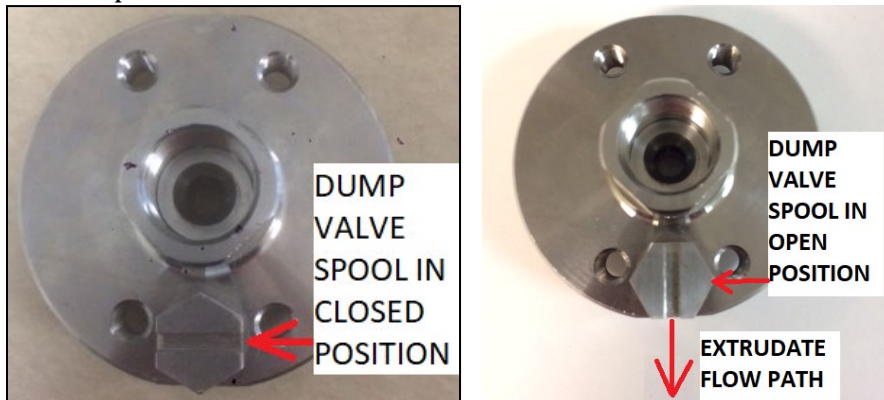
- After the connection is made between the VI system assembly and the process connection, the IRCU-STAND casters should be locked in position if the VI system isn't subject to significant shock loads.

6.3 Dump valve

CAUTION: Operating the dump valve involves being in close proximity to hot surfaces and hot flowing plastic. Wear appropriate protection (goggles, face shield, heat sleeves and gloves)

WARNING: The dump valve should only be actuated when the PIV and AUX zones are at temperature. Operating the dump valve at lower temperatures can damage the valve

- The dump valve is used to purge possibly degraded material before it can enter the RSU and possibly cause damage to the RSU
- The dump valve is integrated into the flange that connects the PIV to the ext. tube assy or supply tube
- When not in use, the valve spool should be kept in the closed position (slot in the valve spool parallel with the floor) and insulation in place around the dump valve spool and exit



- To operate the dump valve:
 - wait until the PIV and AUX zones reach operating temperature for at least 10 minutes before trying to operate the dump valve
 - remove the insulation covering the valve exit and spool **then without delay to minimize heat loss in the dump valve:**
 - Engage the spool with a 5/8" wrench from directly below the valve



- turn the spool towards yourself, **being careful not to have your hand/arm under the extrudate flow path**

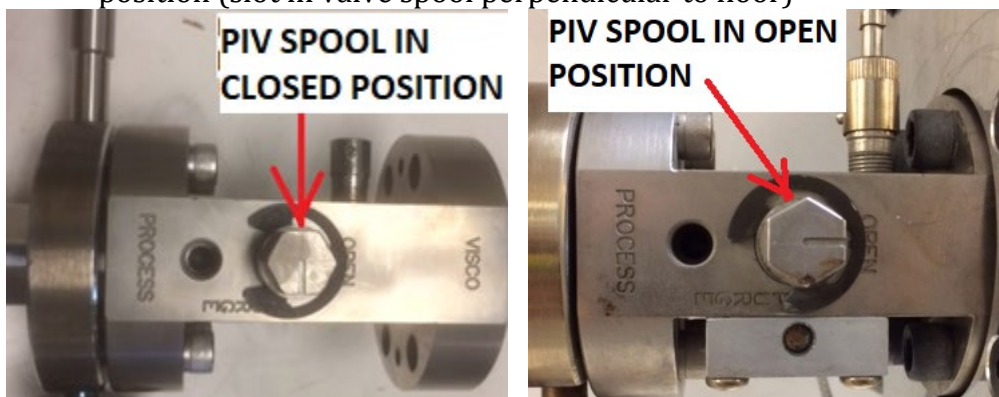


- rotate the spool up to 90degrees until the plastic is flowing
- once material is flowing, the spool can be moved towards the closed position to reduce the amount of extrudate exiting the valve
- Return the spool to the closed position when completed with the material purge

6.4 Process Isolation Valve (PIV)

WARNING: The PIV should only be actuated when the flowblock, PIV and AUX zones are at temperature. Operating the PIV at lower temperatures can damage the valve

- The process isolation valve (PIV) is used to block or allow the flow of material from the process connection to the RSU pump inlet
- When the ViscoIndicator is not in use, the valve spool should be kept in the closed position (slot in valve spool perpendicular to floor)



- To operate the PIV:
 - Purge material as necessary using the dump valve; see section 6.3
 - wait until the RSU, PIV, and AUX zones reach operating temperature for at least 10 minutes before trying to operate the PIV
 - Engage the PIV spool with a 9/16" wrench and turn the spool 90 degrees counterclockwise to open the valve

6.5 Rheological Sensing Unit (RSU) Extrudate Stream

- Extrudate will collect under the RSU as it exits the RSU die through the bottom cover of the RSU during normal ViscoIndicator operation
- If this material is not removed from under the RSU regularly, it may build up to the point where it blocks the die exit and can cause the RSU to malfunction
- Regularly remove material from under the RSU to maintain system performance
- The time interval between removing material is highly process dependent (material type, die geometry, pump speed, and other variables affect the time interval)



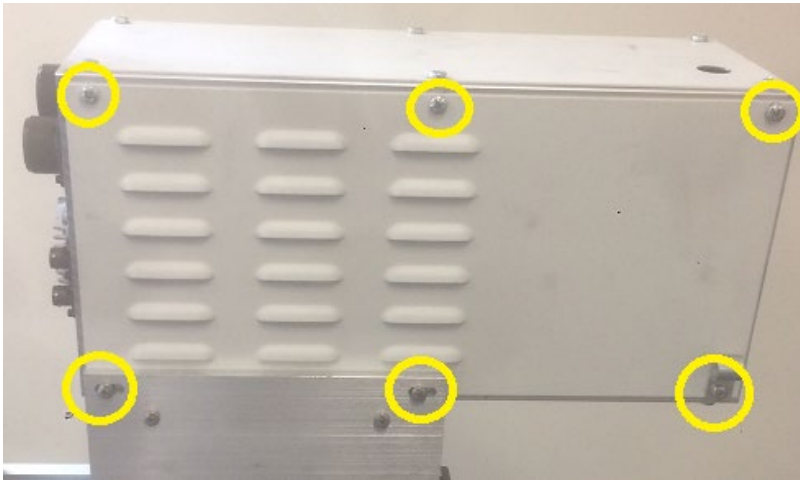
7 HMI Operation (Obtaining rheological measurements from the ViscoIndicator)

- Please see the separate Dynisco Operation Manual for information

8 Preventative Maintenance

8.1 Check RSU enclosure for plastic leaks

- Remove the 6 screws holding on the right cover of the RSU (yellow circles) This is the cover on the right hand side of the RSU if the RSU is between yourself and the extruder.
- **Caution:** RSU should be properly supported before removing 2 mounting screws holding head onto bracket.



- Visually examine all the pressure port connections to the flow block/flange (pressure transducer, burst plug, and capillary plate)
- If extrudate is seen, retighten connections at leak points at check system
- Reinstall the cover.

9 Service

9.1 Changing RSU burst plug

- Confirm the ViscoIndicator is not at pressure and the PIV is closed
- Bring system to process temperature
- Use a 5/8 " wrench to unthread the burst plug from the top cover of the RSU, being careful not to damage the delicate sensor tip during removal
- Apply anti-seize to the new burst plug threads and reverse previous steps and install burst plug to 25 ft-lbs (42 ft-lbs max).

9.2 Changing Pressure Transmitter

- Confirm the ViscoIndicator is not at pressure and the PIV is closed
- Bring system to process temperature
- Remove the 6 screws holding on the right cover of the RSU (see section 8.1)
- Disconnect the electrical plug attached to the PT
- Use a 5/8 " wrench to unthread the PT from the flowblock flange, being careful not to damage the delicate sensor tip during removal
- Carefully angle the PT and remove the PT from the enclosure
- Apply anti-seize to the new PT threads and reverse previous steps and install PT to 25 ft-lbs (42 ft-lbs max).

9.3 Changing capillary

9.3.1 Capillary Removal

- Confirm the ViscoIndicator is not at pressure and the PIV is closed
- Bring the flowblock to process temperature
- Thread the two brass rods together that are part of the capillary insertion/removal Kit (Dynisco P/N 1012511)
- Thread aluminum capillary tip onto brass rod assy (you now have the " capillary tool assy")
- Thread aluminum capillary tip of capillary tool assy into capillary retaining plate, being careful to insert the tip first into the capillary already installed in VI head
- Unscrew 4 screws of capillary retaining plate so they are free of the flow block, but still captured by retaining plate
- Pull directly downward to remove the capillary retaining plate (capillary will most likely not come free as it is held by plastic residue inside the flow block)
- Remove burst plug installed thru top cover of RSU
- Unthread the capillary retaining plate from the capillary tool tip and place in a safe location to cool

- Place a rag/gloved hand under the RSU capillary hole where the capillary is still positioned.
- Push the brass rod end of capillary tool assy down into the RSU from above, through the now open burst plug hole, to push the capillary out of the flowblock.
- capture the capillary as it exits the flowblock and place it in a safe location to cool

9.3.2 Capillary Installation

- Reinstall burst plug into top of VI head
- Thread capillary plate onto aluminum capillary tip of capillary tool assy again
- Place capillary onto aluminum capillary tip of capillary tool assy
- Slide capillary into VI head flow block until capillary retaining plate is flush against flow block surface
- Reinstall 4 screws captured by retaining plate into flow block
- Carefully unthread capillary tool, then pull tool assy down and away from VI head

9.4 Detaching VI main system from process connection

- Bring the system to normal operating temperature (process temp)
- Close the PIV
- Confirm the ViscoIndicator is not at pressure and the PIV is closed
- Shut the VI system down and unplug the power from the RCU
- **Perform the following steps while the VI is still at temperature:**
 - Remove any insulation wrapped around the PIV
 - Perform steps from section 5.3 in reverse order to remove the PIV RTD, PIV bayonet fitting, and PIV heater block with heater.
 - NOTE it is not necessary to remove the PIV heater from the PIV heater block.
 - Remove the four SHCS 3/8"-16 x 1.5" lg, Dynisco p/n F714, screws that clamp the PIV to the flow block in the RSU.
 - Unlock the casters of the IRCU-STAND if locked
 - Check if the PIV/flow block connection pulls apart easily
 - If PIV/flow block connection will not pull apart easily, use two 1/4-20 thd jack out screws located in-between the four screws that had held the PIV to the flow block to break the connection.
- Disconnect the cable connections (all connections) between the process connection parts and the RSU
- With all four casters unlocked, roll the VI assy away from the extruder, leaving the process connection and PIV in place attached to the extruder.

9.5 Preparing VI system for shipment

- Retain original Dynisco RSU and RCU shipping boxes
- Remove all cabling and Vortex coolers from the RSU and RCU before shipment.

- To ship the RSU safely the IRSU-MOUNT and PIV must be attached to the RSU
- Place RCU into the RCU shipping box with the RCU enclosure door face up.

10 Support/Contact Dynisco

10.1 Recommended replacement parts / list and drawings of replacement parts

To maximize the service life of your ViscoIndicator, use only original replacement parts from Dynisco.

Please indicate the machine number, the construction year and the ordering number and position of the replacement parts in your order. This allows us to send you the requested replacement parts faster.

Please contact:

For Americas and APAC:

Dynisco

Phone: +1 508 541 9400

Fax: +1 508 541 6206

For EMEA:

Dynisco Europe GmbH

Phone: +49 (7131) 297 0

Fax: +49 (7131) 297 166

11 Customer service

Replacement part orders and service procedures are handled by our Customer Service department. Please contact:

Dynisco
38 Forge Parkway
Franklin, MA 02038, USA

Phone: +1 508 541 9400
Fax: +1 508 541 6206
E-mail: infoinst@dynisco.com

Dynisco Europe GmbH
Pfaffenstrasse 21
74078 Heilbronn
Germany

Phone: +49 (7131) 297 0
Fax: +49 (7131) 297 166
Email: dyniscoeurope@dynisco.com

Please inform us immediately if you need the help of a service technician on site.

12 Warranty

DYNISCO guarantees, that each product has been developed and produced in accordance with the current state of technology. DYNISCO guarantees, that each individual product at the time of delivery is free of errors in manufacturing or material and meets the specifications and performance standards described in the applicable documents and data sheets under the operating conditions described for each case.

As the guarantee period, DYNISCO grants a 12-month guarantee from the date of delivery, when the ViscoIndicator is used in single-shift operation. If it is used in multiple-shift operation, the duration of the guarantee is reduced to 6 months.

The guarantee covers - assuming appropriate usage and excluding willful damage - the primary design and error-free manufacture of the product, but not wearing parts such as knives, screens, power supply cables and connectors, etc.

The guarantee is void if the operator makes changes to the ViscoIndicator which DYNISCO has not specifically approved, or if the ViscoIndicators are used for other purposes than those described by Dynisco.

Dynisco Inc